

CHAPTER 9: SOCIAL INFRASTRUCTURE

9.1 Introduction

In the Master Plan for Dhakuakhana (2041), public and semi-public includes education, health, socio-cultural, religious uses, police stations, fire stations, post and telegraph, cremation, and burial grounds, etc. Education and health sectors constitute two important pillars of social infrastructure that form the foundation for economic, social including human development. While education provides the vital input for increasing the supply of trained and motivated manpower, health enables optimum utilization of human resources.

In this chapter, education and health are analyzed comprehensively. Needless to underscore that the town severely lacks higher educational institutions in science, engineering, management, and medical fields. The provision of these higher educational facilities also needs to be done at the earliest for a better and fast-paced socio-economic development of the town. The existing facilities, their spatial distribution and challenges are analyzed now.

9.2 Education

9.2.1 School Education

Before the education sector is comprehensively analyzed, definitions of the hierarchy of schools need to be clearly defined.

Primary School (P): Schools providing education from standard 1 and upwards up to and inclusive of standard V are classified as primary schools.

Secondary School (S): Schools providing education from standard IX and upwards up to and inclusive of standard X are classified as secondary schools. A composite school with 1 to X standard is treated as three separate units and counted separately under the categories of primary school, middle school, and secondary school.

Senior Secondary School (SS): Schools and colleges that provide education for standards XI and XII and first and second year of the pre-university course fall under

this category. There are senior secondary schools with standard 1 and upwards up to standard eighth.

Free and compulsory education is provided in Assam to the students up to the age of 14 years. Some of the significant schemes under secondary education department in Assam are as follows:

'AAROHAN', for mentoring and monitoring of talented students from the remote, rural, and poor families:

Government has initiated a series of ambitious programmes to improve the quality of Secondary Education segment. 'AAROHAN', is one such initiative, for the identification of talented students from the remote, rural and poor families for the mentoring and monitoring of their academic career.

'SAPTADHARA' under RMSA:

This is a unique scheme for imparting education especially in extracurricular activities and for providing an opportunity to every young child to explore Global knowledge on skill based innovative teaching learning tactics. SAPTADHARA scheme has been implemented in 324 Higher Secondary Schools and 51 Junior Colleges across the State.

Repository of educational records:

Government of Assam has proposed an electronic platform for creation of repository of educational records of students for easy maintenance and instant access to all stakeholders with due permission.

Distribution of free bicycles to BPL Girls students up to Class-X studying in Govt. and provincialized High/Higher Secondary School":

With an objective of reducing the dropout rate of Girls students at Secondary level and to increase enrollment of Girls, Government of Assam is providing free bicycles to school going Girls up to Class-X studying in Govt. and provincialized High/Higher Secondary Schools. Increasing Mobility and Socialization are the positive outcomes that have been observed amongst the school going girls. This has resulted in easy transportation for the Girls.

Waiving of Admission Fees for the students in Class XI in all Higher Secondary Schools/Colleges provided that the income of their parents is below or Rs.1.00 lakh (Rupees one lakh) only per annum from all sources:

Government of Assam in the Secondary Education Department decided that no provincialized / Government Higher Secondary Schools and Junior Colleges of Assam will take fees including admission fees, tuition fees and any other fees from the students who will take admission in the HS 1st year provided that the income of their parents is below or Rs.1.00 lakh (Rupees one lakh) only per annum from all sources

The town or village wise data for educational facilities that are available in Dhakuakhana are shown in **Table 9.1** and Table 9.2 respectively.

Table 9.1: Education Facilities in Dhakuakhana Town, 2011

Total Population	Primary School		Secondary School		Senior Secondary School	
	Requirement	Current Availability	Requirement	Current Availability	Requirement	Current Availability
13,502	6	16	3	9	2	13

Source: UDISE+ and URDPFI Guidelines 2014

Table 9.2: Education Facilities in Villages of Dhakuakhana, 2011

Sl. No	Census code	Villages (Census Name)	Total Population of Village	Primary School	Secondary School	Senior Secondary School
1	288395	Bahpara	958	1	1	0
2	288350	Bantow Chamuah Pathar	315	1	0	0
4	288349	Bantow Gaon	2,740	3	0	0
3	288341	Bantow Pathar	149	1	0	0
6	288392	Bhalukguri Chapari	235	1	0	0
5	288396	Borhola Chapari	9	0	0	0
8	288354	Daghala Chapari	247	1	0	0
7	288393	Dakhin Chapari	124	0	0	0
9	288369	Dighala Hiloi Dhari	2,539	4	2	1
12	288348	Dullapara Bhari	880	3	0	0
10	288339	Gohain Bari	802	1	0	1
11	288342	Gohain Bari Pathar	135	0	0	0
13	288372	Gohain Handique	1,584	5	0	0
14	288358	Jarani Chapari	87	1	0	0

Sl. No	Census code	Villages (Census Name)	Total Population of Village	Primary School	Secondary School	Senior Secondary School
15	288371	Jiamoria Gaon	2,351	5	1	0
16	288338	Kala Kata Chetia	2,032	4	0	0
17	288401	Kuhimari Chapari	0	0	0	0
19	288436	N.C. Bantow	49	0	0	0
20	288410	N.C. Simaluguri	637	1	0	0
18	288365	Narayanpur Chapari	203	1	0	0
21	288360	No.1 Ghilaguri	425	1	1	0
22	288361	No.2 Ghilaguri	66	0	0	0
23	288394	Pithiyal	1,371	3	1	0
24	288364	Teliachapari	117	1	0	0
Total			18,055	38	6	2

Source: Census of India (2011).

Thus, for the population of 18,055 within the villages, the educational facilities that are to be provided as per URDPFI guidelines are provided as below in Table 9.3.

Table 9.3: Requirement of Education Facilities in Villages of Dhakuakhana, 2011

Total Population	Primary School		Secondary School		Senior Secondary School	
	Requirement	Current Availability	Requirement	Current Availability	Requirement	Current Availability
18,055	6	38	3	6	2	2

Source: Census of India (2011) and URDPFI Guidelines (2014).

Hence, it is observed that there is lack of higher educational facilities within the villages although schools are available within the town area.

During the field survey by the SPA Delhi team during March 2022, it was found that the condition of most of the educational infrastructure in the town is not good (**see Figure 9.1**). While furniture is available in most of the classrooms, the condition of the furniture and walls is poor schools are functioning without proper walls around their classrooms and temporary partitions made from tin or bamboo sheets are being used to

segregate the different classes. The condition of WASH facilities is also very poor in many of the schools.

Figure 9.1: Condition of School Infrastructure in Dhakuakhana Town, 2022



Source: SPA New Delhi (2022).

9.2.2 Higher Education

The higher educations which are present in Dhakuakhana are colleges only. The definition of such facility is given as below:

College is an educational institution or establishment, in particular one providing higher education or specialized professional or vocational training.

In Dhakuakhana there are total 3 colleges, details of which are provided in below table.

Table 9.4: List of Colleges in Dhakuakhana, 2022

S. No.	Name of the College	Type of Institution	Education
1.	Dhakuakhana College	Government	B. A and B.Sc.
2.	Dhakuakhana Normal School	Government	Diploma in Elementary Education
3.	College of Teacher	Private	B.Ed.

S. No.	Name of the College	Type of Institution	Education
	Education, Dhakuakhana		

Source: Education Department, Dhakuakhana (2022).

• **Dhakuakhana College**

Dhakuakhana College in the District of Lakhimpur, Assam (India) was established in 1966. It envisages social transformation through higher education and community reach out programs. Most of the students are belonging to the underprivileged sections of the society viz. the Scheduled Tribes, Scheduled Castes and Other backward classes. The college is affiliated to the Dibrugarh University, Dibrugarh and recognized by the UGC under sections 2(f) and 12(B).

It offers undergraduate courses in Science and Humanities having sixteen teaching departments. It also runs a Bio-Tech Hub and a study centre under the Krishna Kanta Handique State Open University (KKHSOU). The present students' enrollment is more than one thousand (including H.S Classes). The 14.95-acre big campus is having the requisite infrastructures- the administrative building, well equipped library and classrooms, laboratories, playground, Boys and Girls Hostel, the canteen, and other basic amenities.

The courses offered by the college are shown below in Table 9.5.

Table 9.5: Name of Courses offered by the Dhakuakhana College, 2022

Name of the UG programme	Name of the course
B.A.	Assamese
	Anthropology
	English
	Economics
	History
	Political Science
	Sociology
	Mathematics

Name of the UG programme	Name of the course
B.Sc.	Anthropology
	Botany
	Chemistry
	Mathematics
	Physics
	Zoology
PG program under Directorate of Open and Distance Learning under Dibrugarh University	Assamese, English, Political Science, Sociology, Economics, Education and Mathematics
UG and PG programme under Krishna Kanta Handique State Open University, Guwahati	Assamese, English, Political Science, Sociology, Economics, Education and History

Source: Dhakuakhana College Administration (2022).

The category wise detail of number of students enrolled from 2016 to 2021 has been shown in **Table 9.6** and **Table 9.7** for B.A and B.Sc. respectively. It reflects that majority of students are under privileged students from ST and OBC categories whereas number of female students is greater than number of male students. It is also observed that the student – teacher ratio within the college is around 20:1.

Table 9.6: Enrolment of Students in Undergraduate Courses during 2016-2021

Year	Total Students (UG Course)	Total SC Students	Total ST Students	Total OBC Students	Total General Students	Others	Male	Female
2016-17	919	59	343	432	80	05	484	435
2017-18	945	53	352	442	89	09	384	561
2018-19	895	63	350	398	76	08	463	432
2019-20	854	69	321	384	76	04	389	465
2020-21	907	76	334	397	84	16	458	449
Total	4,520	320	1,700	2,053	405	42	2,178	2,342

Source: Dhakuakhana College Administration (2022).

Table 9.7: Enrolment of Students in Higher Secondary Courses During 2016-2021

Year	Total Students (Higher Secondary Course)	Total SC Students	No. of ST students	No. of OBC students	General category students	Others	Male	Female
2016-17	468	36	169	217	29	17	241	227
2017-18	555	46	153	303	49	04	270	285
2018-19	586	46	173	313	49	05	298	288
2019-20	534	53	191	242	38	10	247	287
2020-21	639	53	219	300	57	10	313	326
Total	2,782	234	905	1,375	222	46	1,369	1,413

Source: Dhakuakhana College Administration (2022).

Infrastructure facilities within the college are less than adequate with toilets 1 per 90 students. Barrier free design is provided in the college with three numbers of ramps. The infrastructure details are shown in **Table 9.8**.

Table 9.8: Infrastructure Facilities in Dhakuakhana College

S. No.	Type of Facility	Number
1.	Toilet	9
2.	Hand wash	5
3.	Drinking water	7
4.	Ramp	3
5.	Furniture	-
6.	Boundary wall	1(front side)

Source: Dhakuakhana College Administration (2022).

Figure 9.2: Infrastructure Condition of Dhakuakhana College

Source: SPA New Delhi (2022).

- **Dhakuakhana Normal School**

Dhakuakhana Normal School is a Diploma College in Elementary Education spread over a land of 20 bighas (2.67 hectares). It is governed by the State Government. The

number of students enrolled in each year has been shown in **Table 9.9**. It is observed that the numbers of students are decreasing rapidly as they have eliminated the distance learning mode from 2019.

Table 9.9: Enrolment of Students from 2017 to 2021

Year	Total Students	Mode
2017-18	1,734	Regular and Distance Learning
2018-19	667	Regular and Distance Learning
2019-20	50	Regular
2020-21	100	Regular
Total	817	

Source: Dhakuakhana Normal School Administration (2022).

The infrastructure condition of the college is much poor. Drinking water is not available for students and teachers. Running water which is available is not sufficient. There is lack of security in boys' and girls' hostel and events of theft have also been noticed. The damaged condition of the toilet, classrooms, electric meter box which are beyond usable condition and unhygienic condition of the drinking water supply are shown below in Error! Not a valid bookmark self-reference.. No fire safety measures are prevailing within the campus whereas norms suggest that minimum 20 numbers of fire extinguishers should be present. Continuous electric supply is also not present; every 2-3 hours there is power cut. Moreover, the electric bill is also high due to faulty power supply.

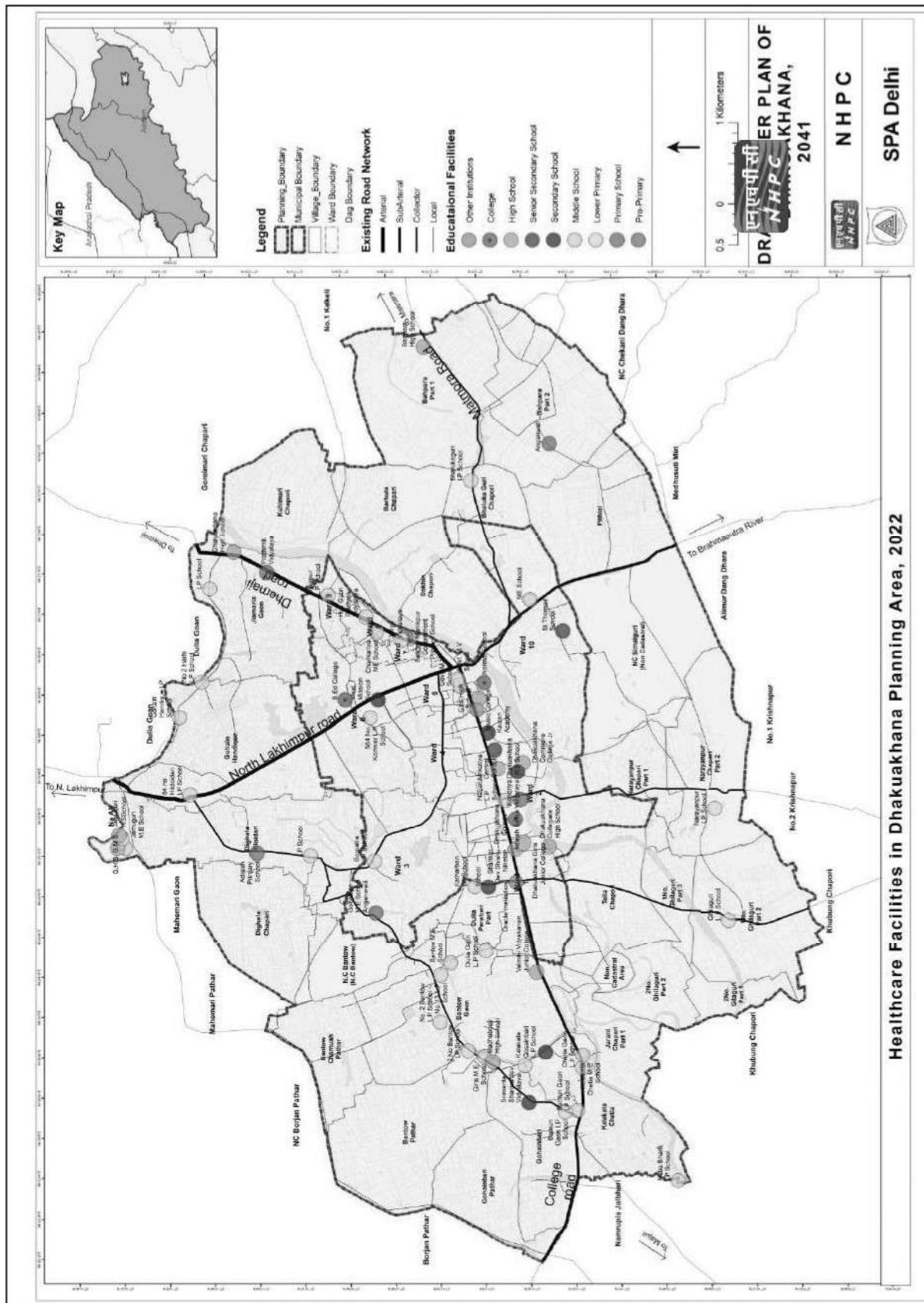
Figure 9.3: Poor Infrastructure Condition of Normal School, Dhakuakhana, 2022

Source: SPA New Delhi (2022).

9.2.3 Spatial Analysis

Thus, the spatial analysis of educational facilities has been shown in **Figure 9.4** which shows that in some villages educational facilities are not present and according to these educational facilities can be proposed for Dhakuakhana.

Figure 9.4: Education Facilities in Dhakuakhana Planning Area, 2022



Source: SPA New Delhi (2022).

9.3 Healthcare

9.3.1 Introduction

Accessible health infrastructure is a necessity for welfare of the residents. This section focuses on the adequacy of health care facilities in Dhakuakhana. There is one 30 bedded hospitals in the town for the population of 13,502 persons (see Table 9.10). As per the Census of India 2011, there is one 5 bedded dispensary and one 6 bedded family welfare centres. There is one Maternity and Child Welfare Centre and one single bedded Maternity home. There is one veterinary hospital in the town. The nearest TB hospital is 6 kilometers away, a nursing home is 5 kilometers away and a mobile health clinic is 17 kilometers away from the town (see Table 9.10). There are 9 medicine shops in the town as per the 2011 Census of India.

Table 9.10: Number and Distance of Medical Facilities in and around Dhakuakhana Town, 2011 (with number of beds)

Hospitals (Allopathic & Others)	Dispensaries / Health Centre	Family Welfare Centre	Maternity and Child Welfare Centre	Maternity Homes	T.B. Hospital/ Clinic	Nursing Homes	Veterinary Hospital	Mobile Health Clinic	Others etc.	Charitable Hospital/Nursing Home (Numbers)	Medicine Shop (Numbers)
1(30)	1(5)	1(6)	1(0)	1(10)	6 km	5 km	1(0)	17 km	5 km	0	9

Source: Lakhimpur District Census Handbook (2011).

Most of the people in the town go to the 30 bedded hospitals for minor ailments. For major diseases, surgeries, maternal deliveries and treatments of chronic diseases, the people have to go to Dibrugarh or Guwahati as these facilities are not available in the town. At present, there are two ambulances available in the hospital for the entire subdivision. These ambulances remain overburdened with patient calls and are presently insufficient to cater to the medical demands of the town.

Figure 9.5: Sub-divisional Hospital and Veterinary Dispensary Dhakuakhana, 2022



Source: SPA New Delhi (2022).

9.3.2 Existing Healthcare Facilities

The town or village wise data for healthcare facilities that are available in Dhakuakhana are shown in **Table 9.11** and Table 9.12 respectively.

Table 9.11: Healthcare Facilities in Dhakuakhana Town, 2011

Total Population	Community Health Centre		Primary Health Centre		Primary Health Sub-Centre		Maternity and Child Welfare Centre	
	Requirement	Current Availability	Requirement	Current Availability	Requirement	Current Availability	Requirement	Current Availability
13,502	2	0	1	1	2	2	2	0

Source: Census of India, Assam (2011) and URDPFI Guidelines 2014

Table 9.12: Healthcare Facilities in Villages of Dhakuakhana (in numbers), 2011

S. No	Census Name of Villages	Total Population of Village	Community Health Centre	Primary Health Centre	Primary Health Sub Centre	Maternity And Child Welfare Centre
1.	Bahpara	958	0	0	0	0
2.	Bantow Chamuah Pathar	315	0	0	0	0
3.	Bantow Gaon	2,740	0	0	0	0
4.	Bantow Pathar	149	0	0	0	0
5.	Bhalukguri Chapari	235	0	0	1	0
6.	Borhola Chapari	9	0	0	0	0

S. No	Census Name of Villages	Total Population of Village	Community Health Centre	Primary Health Centre	Primary Health Sub Centre	Maternity And Child Welfare Centre
7.	Daghala Chapari	247	0	0	0	0
8.	Dakhin Chapari	124	0	0	0	0
9.	Dighala Hilo Dhari	2,539	0	0	1	0
10.	Dullapara Bhari	880	0	0	0	0
11.	Gohain Bari	802	0	0	0	0
12.	Gohain Bari Pathar	135	0	0	0	0
13.	Gohain Handique	1,584	0	0	0	0
14.	Jarani Chapari	87	0	0	0	0
15.	Jiamoria Gaon	2,351	0	0	0	0
16.	Kala Kata Chetia	2,032	0	0	0	0
17.	Kuhimari Chapari	-	0	0	0	0
18.	N.C. Bantow	49	0	0	0	0
19.	N.C. Simaluguri	637	0	0	0	0
20.	Narayanpur Chapari	203	0	0	0	0
21.	No.1 Ghilaguri	425	0	0	0	0
22.	No.2 Ghilaguri	66	0	0	0	0
23.	Pithiyal	1,371	0	0	0	0
24.	Teliachapari	117	0	0	0	0
Total		18,055	0	0	2	0

Source: Census of India, Assam (2011)

Thus, for the population of 18,055 within the villages, the healthcare facilities that are to be provided as per URDPFI guidelines are provided as below in Table 9.13.

Table 9.13: Requirement of Healthcare Facilities in Villages of Dhakuakhana, 2011

Total Population	Community Health Centre		Primary Health Centre		Primary Health Sub-Centre		Maternity and Child Welfare Centre	
	Requirement	Current Availability	Requirement	Current Availability	Requirement	Current Availability	Requirement	Current Availability
18,055	2	0	1	0	2	2	2	0

Source: Census of India, Assam (2011) and URDPFI Guidelines 2014

Thus, it is observed that healthcare facilities are not adequate in the town as well as village areas of Dhakuakhana. Those which are present are also of poor condition as mentioned below.

9.3.3 Issues

Pregnant women face difficulty as ambulance facility is poor, only 1 is functional. Monetary fund is not available. No blood bank is present with lack of infrastructure as the condition of drinking water is poor and electricity is not continuous. Cases of 2 – 3 days without power supply have also been reported. Internet connection is very poor, and 30 percent of people are unable to avail these services. Nursing home is also not present within the localities. The primary health sub centres which are present lack specialist doctors and adequate oxygen supply.

The major diseases that occur at a frequent rate every year are Japanese Encephalitis, Scrub Typhus, Diarrhea etc. and these diseases mainly spread within the tribal population due to unhygienic living condition. Maternal issues, anemia and nutrition deficiency is found within the children.

Figure 9.6: Dhakuakhana Sub-Divisional Civil Hospital, 2022

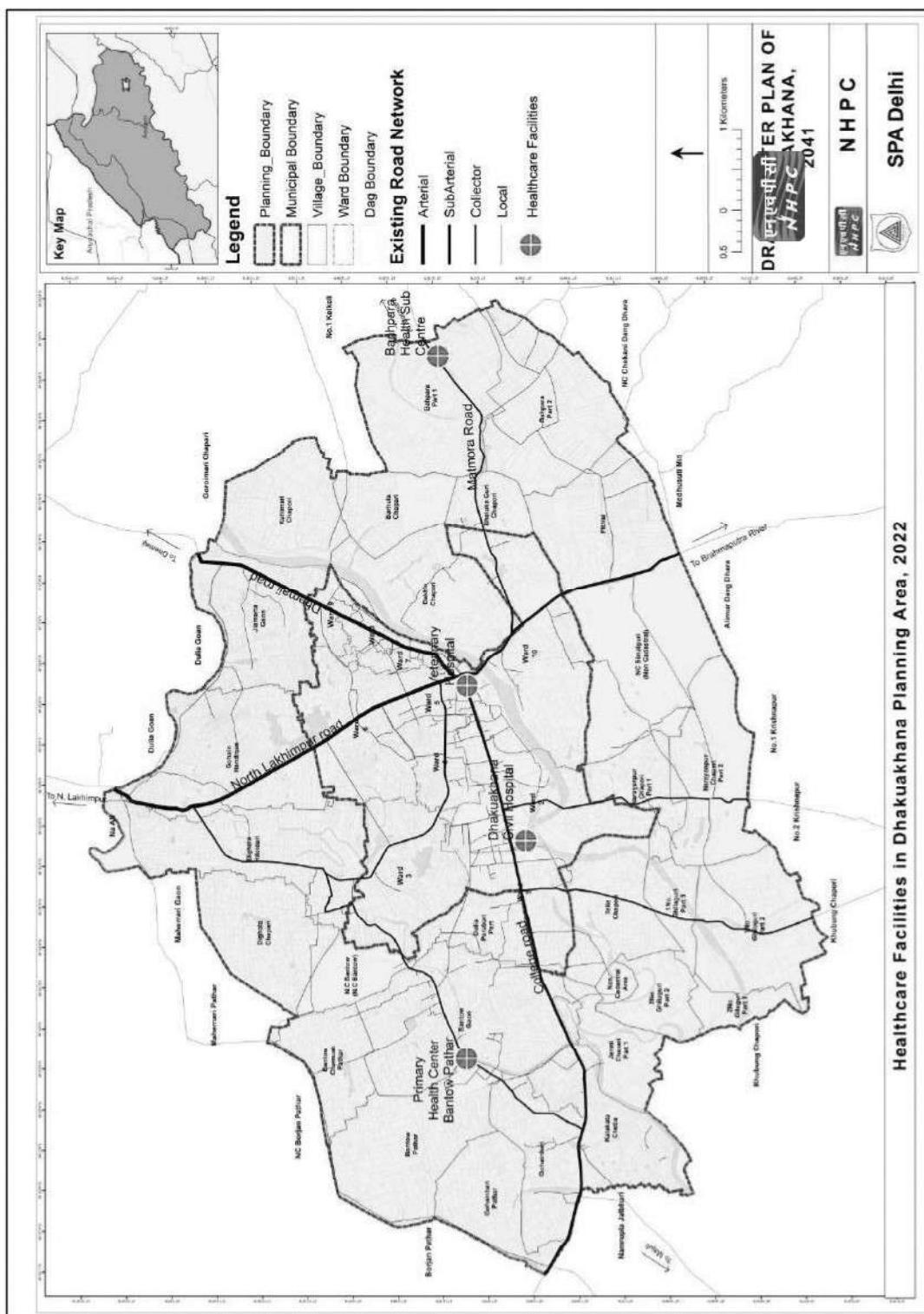


Source: SPA New Delhi (2022).

9.3.4 Spatial Analysis

Thus the spatial analysis of healthcare facilities has been shown in **Figure 9.7** which shows that in most of villages healthcare facilities are not present and according to these healthcare facilities can be proposed for Dhakuakhana.

Figure 9.7: Healthcare Facilities in Dhakuakhana Planning Area, 2022



Source: SPA New Delhi (2022).

9.4 Recreation and Cultural Facilities

As per the Census of India, 2011 there are no orphanage homes, working women's homes, old age homes, stadiums, and cinema theatres in the town. The nearest stadium and cinema theatre is in North Lakhimpur. There are two auditoriums in the town. The nearest public library is in North Lakhimpur (**see Table 9.14**)

Table 9.14: Recreational and Cultural Facilities in and around Dhakuakhana Town, 2011

Orphanage Home	Working women's hostels	No. of Old Age Home	Stadium	Cinema Theatre	Auditorium/ Community halls	Public libraries	Reading rooms
Nil	Nil	Nil	In North Lakhimpur	In North Lakhimpur	2	In North Lakhimpur	In Halem

Source: Lakhimpur District Census Handbook (2011).

Figure 9.8: Recreational Facilities in Dhakuakhana, 2022



Source: SPA New Delhi (2022).

Thus, for the overall population of 31,557 within the towns and villages, the recreational facilities that are to be provided as per URDPFI guidelines are provided as below in Table 9.15.

Table 9.15: Requirement of Recreational Facilities in Dhakuakhana

Administration	Total Population	Residential and Neighbourhood Playground		Housing Area Park		Neighbourhood Park	
		Requirement	Current Availability	Requirement	Current Availability	Requirement	Current Availability
Town	13,502	4	2	3	1	1	0
Villages	18,055	4	0	3	0	1	0
Total	31,557	8	3	6	0	2	0

Source: SPA New Delhi (2022) and URDPFI Guidelines 2014.

Hence, it is observed that there is severe lack of recreational facilities in overall planning area. The playgrounds and parks those which are present are only within the town area only.

As per the survey conducted by SPA Delhi team in 2022, one SIRD Indoor Sports Complex is under construction in Telia Chapor village having an area of 1.04 hectare. It also consists of assembly hall, guest houses etc. to accommodate the visiting population.

9.5 Fire Safety

There is only one fire station in Dhakuakhana town comprising of 20 personnel. The fire station has one rescue vehicle, two IRB and OBM and two fire safety vehicles. The major occurrences for fire breakouts are in the bamboo cottages. The fire incidents from 2015 are mentioned below in Table 9.16. The number of incidences of fire is in increasing trend and requires providing more importance to increase facilities to tackle the situation.

Table 9.16: Year-wise Fire Incidents in Dhakuakhana

Year	2015	2016	2017	2018	2019	2020	2021
Number of Fire Incidents	6	8	4	4	2	14	10

Source: Dhakuakhana Fire Tender Office 2022

It is observed that in most cases the fire tender vehicles cannot reach the disaster site within 3-5 minutes as there is only 1 fire station in the entire planning area. Moreover, roads are not as per by laws also for the minimum maneuvering of the vehicles.

9.6 Conclusions

In terms of social infrastructure, the town has enough primary, secondary, and senior secondary schools. But the quality of infrastructure in these schools is not good. This improvement of school infrastructure needs to be made a priority. The town severely lacks higher educational institutions in science, engineering, management, and medical fields. The provision of these higher educational facilities also needs to be done at the earliest for a better and fast-paced socio-economic development of the town. Healthcare facilities are extremely poor in terms of both availability and hygienic condition. Sub centre healthcare should be improved and specialist doctors like gynecologist should be appointed for the better treatment of patients. For recreational facilities more housing area parks and playgrounds are required as per URDPFI guidelines.

CHAPTER 10: ENVIRONMENT AND DISASTER

10.1 Introduction

The rivers Charikariya and Karha surround Dhakuakhana town on the south and east sides. The terrain of the town is flat, and the area can be categorized as a flat floodplain area. Since the town is witnessing rapid developmental change and regional transformation, the environmental impact of such changes also needs to be kept in mind. The growing development in the town has led to an increase in the demand for developable land and basic infrastructure amenities. The provision of infrastructure and amenities in the town cannot be accommodated by ignoring some key environmental and disaster related concerns. Dhakuakhana lies in a flood, erosion and earthquake prone area and therefore requires a Master Plan that takes into special consideration all its environment sensitive zones and hazard prone areas. Furthermore, some of the major factors contributing to the environmental degradation of the area like polluted water bodies, issues regarding solid waste management, and wetland degradation also require careful consideration in this Master Plan. This chapter focuses on the identification and analysis of the existing challenges faced by the town and come up with desirable actions to make it environmentally sustainable and safer from disasters, hazards, and damages.

10.2 Environment

10.2.1 Air Quality

Since no air quality monitoring stations are present within the town, the data and analyses for the town's air quality is based on the Environment Impact Assessment (EIA) study conducted in September 2021 by Public Works Road Department for Dhakuakhana-Butikar-Tinialai-Telijan up-gradation under Asom Mala Program. To assess the Ambient Air Quality (AAQ) as per CPCB norms, the following parameters have been taken into consideration: Particulate matter size less than $10\mu\text{m}$ or PM $10\text{ }\mu\text{g}/\text{m}^3$, particulate matter size less than $2.5\mu\text{m}$ or PM $2.5\text{ }\mu\text{g}/\text{m}^3$, sulphur dioxide ($\mu\text{g}/\text{m}^3$), nitrogen dioxide ($\mu\text{g}/\text{m}^3$) and carbon monoxide ($\mu\text{g}/\text{m}^3$). The monitoring station that lies the closest to Dhakuakhana town is in No. 2 Thekeraguri which lies approximately 5 kilometres away from the town (see **Figure 10.1**).

Figure 10.1: Sampling Location of Ambient Air Quality Monitoring near Dhakuakhana, 2021



Source: EIA ESMP Report for Asom Mala Program PWRD Assam (2021).

It was found that the ambient air quality meets the National Air Quality (NAQ) standards for the residential areas near No. 2 Thekeraguri. The PM 2.5 concentration varies from 16.8 to 17.8 $\mu\text{g}/\text{m}^3$. The mean PM10 concentration varies from 47.5 to 48.4 $\mu\text{g}/\text{m}^3$. The mean concentration of SO₂ varies from 6.2 to 6.3 $\mu\text{g}/\text{m}^3$. The mean concentration of NOX varies from 12.5 to 12.7 $\mu\text{g}/\text{m}^3$. The mean concentration of CO varies from 0.43 to 0.47 mg/m³. All the values are within the permissible limit (see **Table 10.1**). The growing urbanization and rapid urban transformation need to be planned in such a way that these pollution levels remain under a check for the future as well.

Table 10.1: Ambient Air Quality at No. 2 Thekeraguri Monitoring Station near Dhakuakhana Town, 2021

Parameter	Unit	NAAQS (CPCB)-Permissible Limit	Observed Values	Results
Particulate Matter (PM10)	$\mu\text{g}/\text{m}^3$	100	47.5	Within Permissible Limit
Particulate Matter (PM2.5)	$\mu\text{g}/\text{m}^3$	60	17.8	Within Permissible Limit
Sulphur Dioxide (SO ₂)	$\mu\text{g}/\text{m}^3$	80	6.3	Within Permissible Limit
Nitrogen Dioxide (NOX)	$\mu\text{g}/\text{m}^3$	80	12.5	Within Permissible Limit
Carbon Monoxide (CO)	mg/m^3	4	0.44	Within Permissible Limit

Source: EIA ESMP Report for Asom Mala Program PWRD Assam (2021).

10.2.2 Water Quality

For assessing the ground water quality of Dhakuakhana Town, results from the Environmental Impact Assessment Report for Asom Mala Project of PWRD Assam have been studied. The parameters analysed, include pH, Electrical Conductivity (EC), Total Alkalinity (TA), Total Hardness (TH), Nitrate (NO_3), and Fluoride (F). In the study area, ground water samples were collected at No. 2 Thekeraguri in Dhakuakhana Block at 5 kilometres from the town. The various parameters were tested (see Table 10.2).

Table 10.2: Ground Water Quality at No. 2 Thekeraguri in Dhakuakhana, 2021

Parameter	Unit	Desirable Limit	Permissible Limit	Results
Total Faecal Coliform Bacteria	-	Absent	Absent	Absent/100 ml
pH	-	6.5-8.5	6.5-8.5	7.43
Colour	Hazen	5	25	<5.0
Odour	-	Agreeable	Agreeable	Agreeable
Turbidity	NTU	1	5	<1.0
Total Hardness (CaCO_3)	mg/l	200	600	105.36
Chloride (Cl)	mg/l	250	1000	19.24
Fluoride (F)	mg/l	1	1.5	0.42
Phenol Content	mg/l	<0.001	-	<0.001
Calcium (CaCO_3)	mg/l	75	200	33.45
Magnesium (CaCO_3)	mg/l	30	100	5.3
Sulphate (SO_4)	mg/l	200	400	4.3
Nitrate (NO_3)	mg/l	45	No Relaxation	7.4
Selenium (Se)	mg/l	0.01	No Relaxation	<0.01
Alkalinity (CaCO_3)	mg/l	200	600	124.1
Total Dissolved Solids (TDS)	mg/l	500	2000	161.99
Total Suspended Solids (TSS)	mg/l	-	-	<1.0
Dissolved Oxygen	% By mass	-	-	4.1
Biological Oxygen Demand (BOD)	mg/l	-	-	<2.0
Phosphates	mg/l	-	-	<0.05
Ammonia	mg/l	0.5	No Relaxation	<0.1
Electrical Conductivity	micromhos/cm	-	-	249.22
Sodium (Na)	mg/l	-	-	15.38
Potassium(K)	mg/l	-	-	2.3
Iron (Fe)	mg/l	0.3	No Relaxation	1.33
Total Kjeldahl Nitrogen (TKN)	mg/l	-	-	<0.1
Cadmium (Cd)	mg/l	0.003	No Relaxation	<0.001
Cyanide (CN)	mg/l	0.05	No Relaxation	<0.01
Lead (Pb)	mg/l	0.01	No Relaxation	<0.01

Parameter	Unit	Desirable Limit	Permissible Limit	Results
Arsenic (As)	mg/l	0.01	0.05	<0.01
Total Chromium (Cr)	mg/l	0.05	No Relaxation	<0.05
Mercury (Hg)	mg/l	0.001	-	<0.0001

Source: EIA ESMP Report for Asom Mala Program PWRD Assam (2021).

It can be seen from **Table 10.2** that; the pH of the drinking water was 7.43 which is within the acceptable limit. The Iron content in the water was found to be above the prescribed standards. Total hardness as CaCO_3 was 105.36 mg/l, again within the acceptable limit. BOD level for all analysed ground water samples was also within the permissible limit. Other parameters analysed like chloride, sulphate, fluorides were also found to be well within standards. It can be seen from the results that the ground water quality meets the standards of CPCB for ground water, except for the high level of Iron content.

10.2.3 Soil Quality

As per the data received from the Agriculture Department of Dhakuakhana, the soil of the sub-division is predominantly sandy loam soil constituting 60.57 percent of the composition. 16.71 percent of the soil composition is silty clay loam, 11.87 percent is sandy soil, and 10.85 percent is loamy soil. Nitrogen content varies from 1890 mg/1000g to 1940 mg/1000g. The soil is poor in organic carbon content. Chemically the soil in the town has a neutral pH in the range of 7.16 to 7.24. The soil has less water holding capacity. The overall quality of soil in the town healthy and provides a good base for various agricultural activities.

10.3 Disasters and Natural Hazards

10.3.1 Erosion

Dhakuakhana town is bound by two rivers, Charikaria and Karha, on the south and west respectively. Both the rivers are a perennial sub-tributary of the river Brahmaputra with their sources lying in the low-lying areas in Dhemaji district. They flow through the Dhakuakhana subdivision for a length of about 50 kilometers and fall into the river Subansiri, a major tributary of Brahmaputra. The river Charikariya flows through the Dhakuakhana town from Jiamaria Huz Goan ($27^{\circ}13'2''\text{N}$, $94^{\circ}27'26''\text{E}$) to Katharbari

($27^{\circ}11'30''$ N to $94^{\circ}24'44''$ E) for a length of about 7 kilometers. As per the data received from Dhakuakhana Water Resources Division the river has multiple erosion affected areas within the Dhakuakhana Town. The problem of erosion grew multifold after the flooding of River Brahmaputra at Matmara area 1998 and 2008 led to the change in the flow characteristics of Charikaria. The erosion prone and vulnerable areas near the Charikaria River have been listed in **Table 10.3**.

Table 10.3: Erosion Prone Area in Dhakuakhana Town, 2021

Erosion Prone Areas	Condition
Jiamaria	About 160m of length is erosion affected.
Mohghuli Chapor	About 600m of length is erosion affected.
Backside of Dhakuakhana College	About 700m of length is erosion affected.
Sarala Pathar	Presently this area is not erosion affected but it is predicted to become an erosion prone area in the future due to the meandering nature and changing course of the Charikariya River.

Source: Dhakuakhana Water Resources Division (2022).

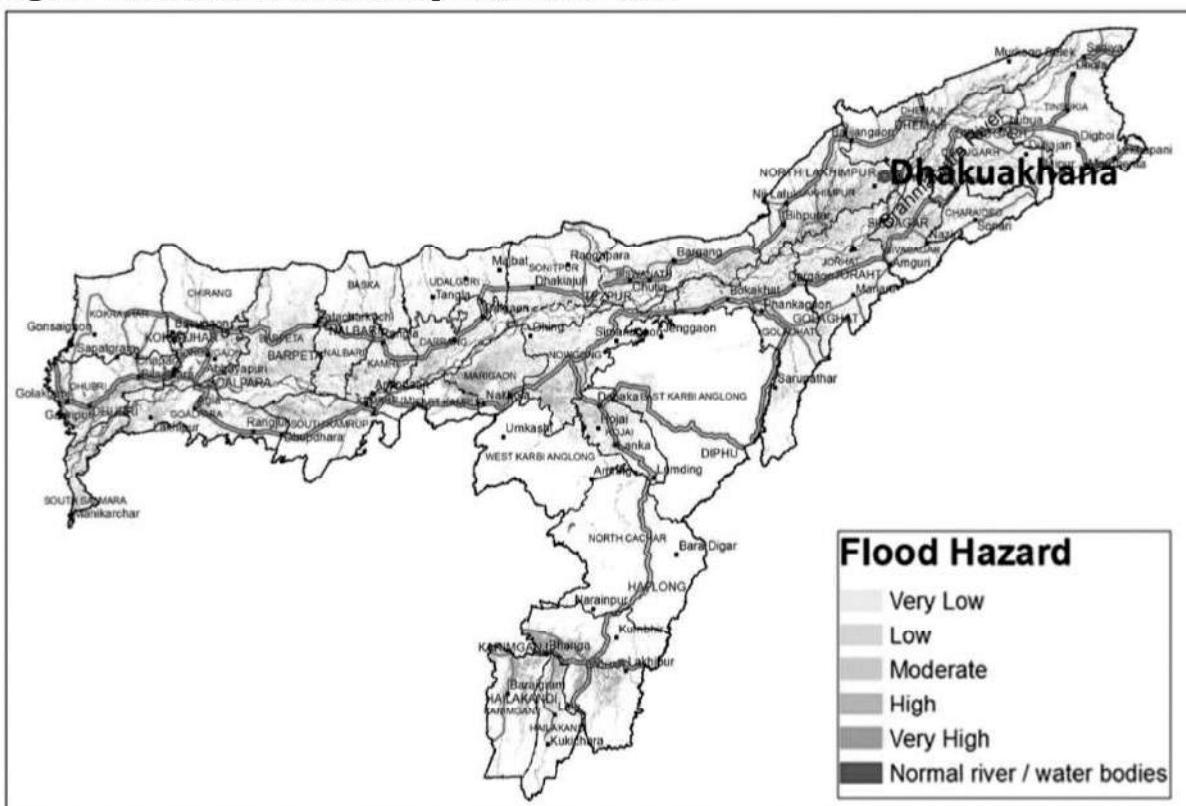
Presently there are no embankments on the river and the erosion prone areas are being protected with some local anti-erosion measures. The river caused massive erosion on the southern side of the Dhakuakhana College and eroded away two households in 2020. Moreover, the erosion of the river uprooted many value trees and affected more than 2500 sq m of land owned by the college. Many Anti-erosion measures have been taken up by the Dhakuakhana Water Resources Division to stop the erosion at various locations like installing RCC porcupine and Geo-bags filled with sand along the rivers bank.

10.4 Flooding

10.4.1 Floods

As per the District Disaster Management Report, Dhakuakhana town is moderately vulnerable to flood hazards (see **Figure 10.2**). As discussed earlier, the presence of the two sub-tributaries, Charikariya and Karha, of the Brahmaputra River near the town increases the flood vulnerability of the area. The flooding of Charikaria and Karha in 1998 and 2008 has affected areas like Matamara and Aamguri Siga massively. The flooding of Karha River caused an embankment breach at Aamguri Siga which led to massive destruction within the Dhakuakhana town.

Figure 10.2: Flood Hazard Map of Assam, 2022



Source:https://www.isro.gov.in/sites/default/files/articlefiles/node/5202/flood_hazard_map_of_assam.pdf (April 2022).

During the months of May to September with the onset of Southeast monsoon rains, huge volumes of floodwater start spilling all along the 720 km length of embankments of the River Brahmaputra in Assam increasing the flood vulnerability of its sub-tributaries even further. Discharge of the Karha River during its high flood season is massive and requires a strong system of embankment to prevent the inundation of

numerous villages and residential areas near it including Dhakuakhana Civil Sub-Divisional hospital.

10.5 Charikariya River

The river Charikariya is a perennial sub-tributary of Brahmaputra and is fed by discharges from a few tributaries namely Gainadi, Jiadhal, Dimow, Jalakiasuti and Moridhal. The river has a total length of about 50 km. However, the stretch falling within the town, from Jiamaria Huz gaon to Katharbari, has a length of 7 km.

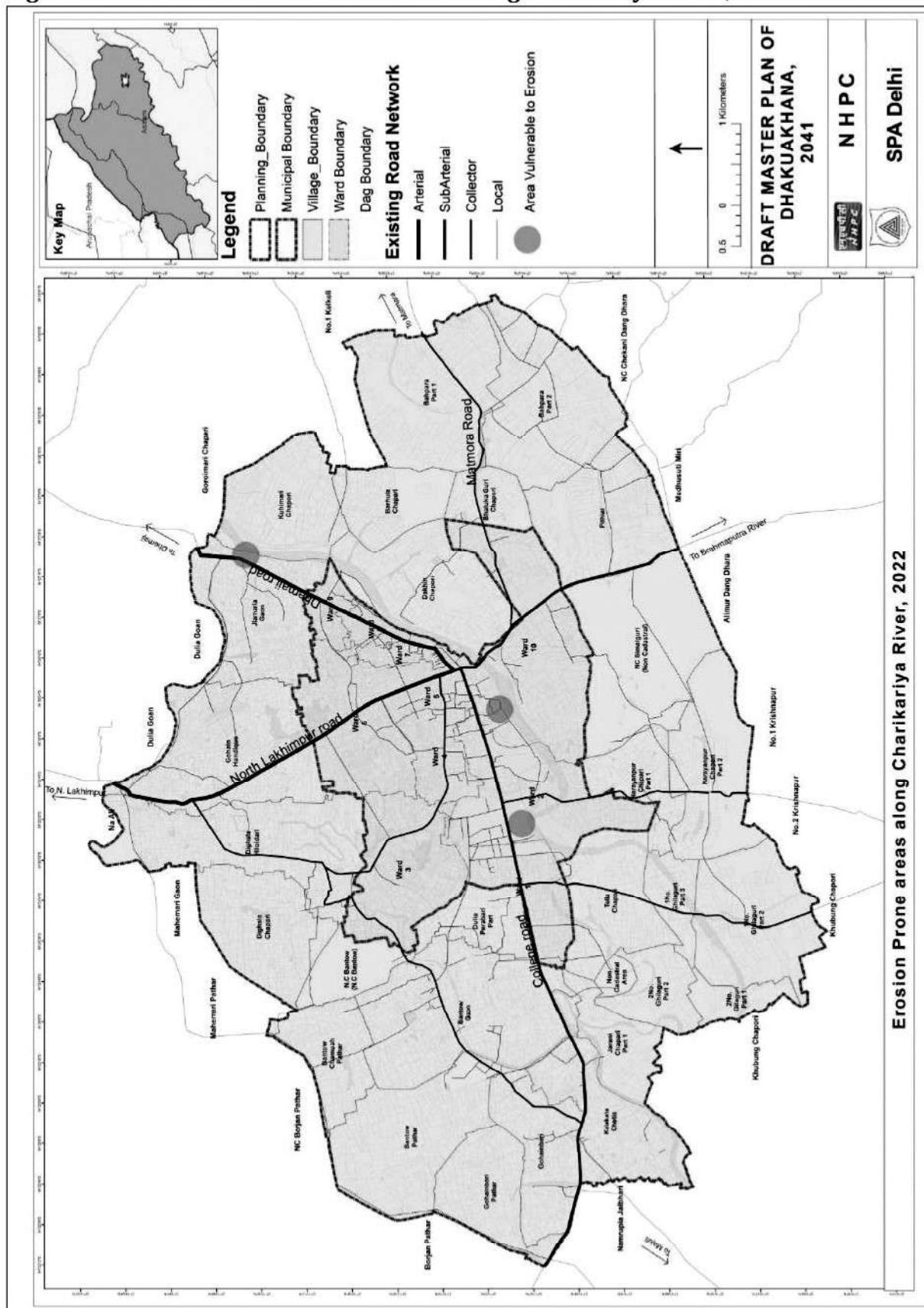
Charikariya has a high ecological value and many species of fish, birds and animals like tortoise and dolphins are dependent on it. The water quality of the river has been observed to be clean with relatively less amount of silt. In fact, many households within the town earn their livelihood by selling fish from the river. However, the meandering nature of Charikariya has resulted in erosion in different areas. The problem of erosion is primarily due to instances of changes in the flow character of the river. The land along the southern bank of the river is a low-lying area with sandy soil, making it highly susceptible to flooding. Therefore, the town has not developed in this direction. Most of the development has occurred towards the northern side of the river.

10.5.1 Vulnerable areas

The Dhakuakhana Water Resource Department has identified the following areas to be vulnerable to erosion near Charikariya river **Figure 10.3 Areas Vulnerable to Erosion along Charikariya River (See Figure 10.3):**

- Jiamoria: About 160 m area is erosion affected at this location.
- Mohghuli chapor: This famous place for Phat Bihu has about 600 m erosion affected area.
- Dhakuakhana College: About 700 m of area is erosion affected at this location. The river caused massive erosion on the southern side of Dhakuakhana College in the year 2020, washing away the residences of two college employees within a short span of time. The erosion caused by the river uprooted a few trees and affected more than one bigha of land owned by the college.
- Sarala pathar: Though no erosion has occurred at this location till date, the area adjacent to the PWD road is highly vulnerable and therefore, needs adequate protection.

Figure 10.3 Areas Vulnerable to Erosion along Charikariya River, 2022



Source: Primary Survey, SPA Delhi (2022).

The town has only two entry routes, one via Ghilamara and the other via Basudev, both of which are extremely vulnerable to water logging. Because of this, road transport generally remains disrupted during floods, making it difficult for people to commute and goods to be transferred.

The stretch of the town situated along the banks of Charikariya does not have a suitable buffer and hence, is highly vulnerable to flooding and erosion. **Figure 10.4** shows the settlements located along the banks of Charikariya near Town Tiniali in Dhakuakhana. Extreme precipitation events can wash away these settlements and therefore, adequate precautionary measures must be implemented.

Figure 10.4: Vulnerable Settlements along the Bank of Charikariya River in Dhakuakhana Town, 2022



Source: Primary Survey, SPA Delhi (2022).

10.5.2 Preventive measures

Many anti-erosion measures have been undertaken at various locations in Dhakuakhana including Dhakuakhana College, Na-Kaphua, Kolakata, Goraimari Kapahua, Thekeraguri, Bhati Kekuri, etc. In Dhakuakhana College, RCC porcupines have been installed with geo-bags in the erosion prone area to prevent further damage as shown in **Figure 10.5**.

Figure 10.5: RCC Porcupines Installed along the Banks of Charikariya River near Dhakuakhana College to Prevent Erosion, 2022



Source: Primary Survey, SPA Delhi (2022).

10.6 Korha River

Korha is a perennial sub-tributary of Brahmaputra which flows across Dhakuakhana sub-division. It has a total length of about 19 km and falls into Subansiri river at Selamukh. The river is fed by scattered discharge of tributaries namely Gainadi, Moridhal, Tangani and Jiadhal. During extreme precipitation, the discharge from the river is intensive and requires a strong system of embankments, especially along its lower banks to prevent inundation of numerous homesteads and villages including the Dhakuakhana Civil Sub-Divisional Headquarter. The river caused devastating floods in 2020 resulting in breaching at Aamguri siga, thereby creating havoc in the daily lives of the people of Dhakuakhana town.

The river flows at 8 km from Dhakuakhana town. However, the entire length of the embankment system from Bhogmukh to Moukhuwa falls within the Dhakuakhana Civil Sub-Division.

10.6.1 Vulnerable areas

The Dhakuakhana Water Resource Department has identified the following areas to be vulnerable to erosion near Kurha river:

- From Ch 8200 m to Ch 9130 m (Bantow Chapor): Bank erosion has been observed at this location. It is near the embankment and is vulnerable to breaching.
- From Ch 3500 to Ch 5500: Raising and strengthening of the embankment is required at this location.
- From Ch 9130 to Ch 19150: Raising and strengthening is required at this location.

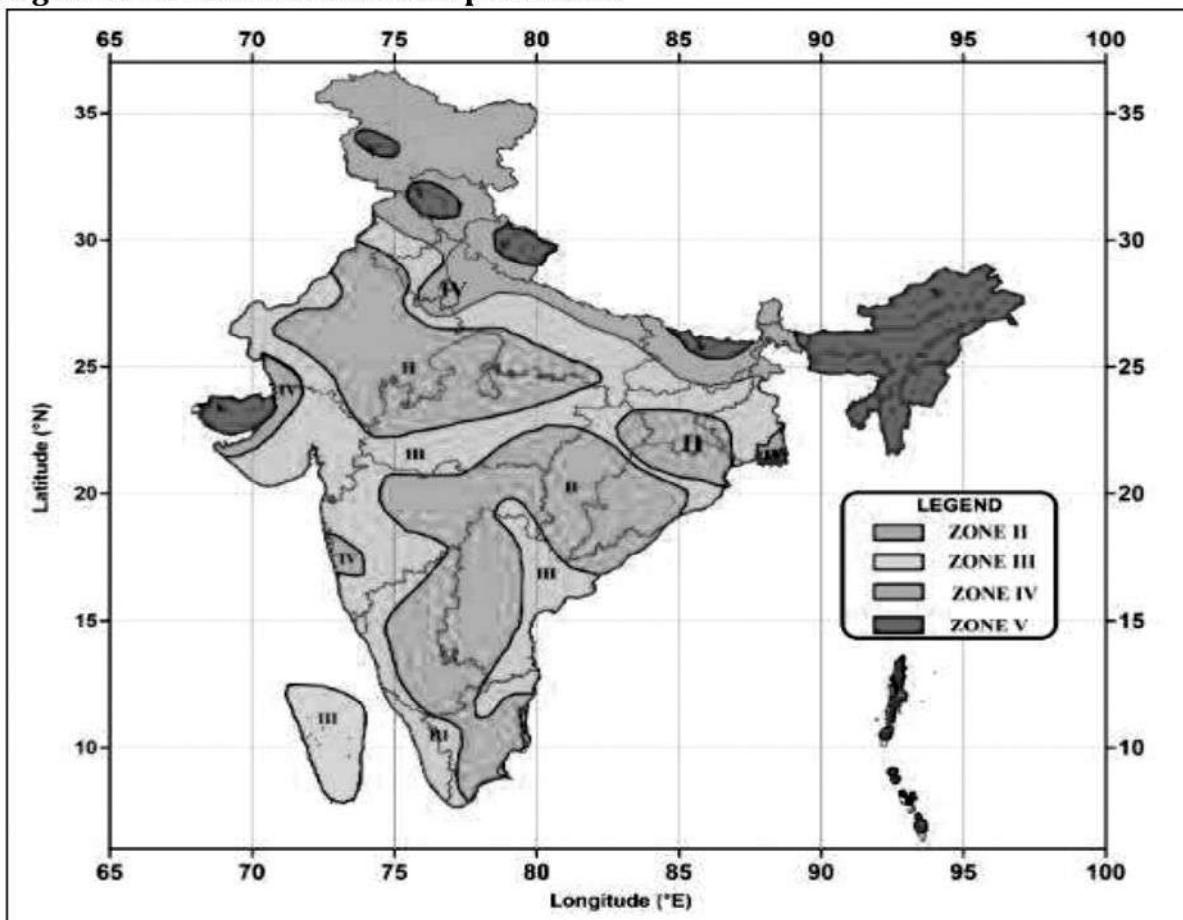
10.6.2 Preventive measures

Raising and strengthening works were undertaken at the embankment from Ch 5500 to Ch 9130 under the Rural Infrastructure Development Fund (RIDF) and the State Disaster Relief Fund (SIDF) for the year 2018-19.

An estimate of raising and strengthening has been submitted by the department for the above-stated vulnerable areas as well.

10.6.3 Earthquake

The state of Assam lies in one of the six most seismically active regions of the world. The entire region falls in Zone V (**see Figure 10.6**), the most vulnerable seismic zone. Twelve major earthquakes have occurred in the region in the last 100 years of which the devastating earthquakes of 1897 in the Shillong plateau and in 1950 in Upper Assam have been recorded as two of the largest earthquakes in the country. Dhakuakhana Town also lies in the Upper Assam region which makes it highly vulnerable to seismic hazards. It is predicted that the region is likely to witness a major earthquake in the very near future. According to a hazard map by the Global Seismic Hazard Assessment Program, the state can expect to have a peak gravitational acceleration (PGA) of 0.24 g to 0.48 g.

Figure 10.6: Seismic Hazard Map of Assam

Source: <https://pib.gov.in/PressReleasePage.aspx?PRID=1740656> (April 2022).

Experiences of the earlier earthquakes in the region have led people here to construct flexible and sufficiently earthquake proof houses popularly known as "Assam Type Houses". The scenario has changed now, and these houses have paved the way for multistory masonry buildings particularly in towns like Dhakuakhana which are experiencing rapid urbanization. If the present trend of construction and population growth continues, the earthquake of magnitude > 7.5 could bring enormous damage to property and great loss of lives. In this context, it is therefore important for the administrative agencies to reflect and plan for strict enforcement of proper building codes and appropriate land use policy in the region. The vulnerability to natural disasters combined with socio-economic vulnerability of the people living in these states poses a great challenge for the government machinery and highlights the need for a comprehensive plan for disaster preparedness and mitigation. Training and capacity building of the officials dealing with emergency situations would be an important instrument of disaster reduction and recovery.

10.7 Conclusions

Dhakuakhana town has abundant water resources and a complex geomorphology. The air and water quality of the town is well within standards. However, the environment is prone to damage due to the rapid urbanization that might happen in the future. All development in this area, therefore, needs to consider environmental assessment and protection as an important part. Dhakuakhana is a multi-hazard prone area with Erosion from the River Charikariya and Karha being major one of the major issues in town. The area is also moderately prone to floods although there has been no major flood related damage in the past five years.

The floods of 1998 and 2008, however, led to severe damages in the town area. To protect life, property, livestock and croplands from floods and erosion related damage, proper embankments and construction of road-cum-bunds at the banks of these rivers needs to be done. The area also lies in high seismic risk zone (zone 5) making it highly vulnerable to earthquakes.

The traditional “Assam type” architecture in the town is slowly transforming to contemporary RCC construction style. Charikaria and Korha are two important rivers feeding into the Dhakuakhana’s ecosystem. However, both these rivers are highly vulnerable to flooding and erosion. Particularly for Charikaria, settlements lie quite close to the banks of the river, hence, adequate protection and prevention measures are required.

The Chief Engineer at the Dhakuakhana Water Resource Department suggested that an embankment should be constructed at the right bank of Charikaria with well-equipped bank protection works to curb this issue. Also, the Korha embankment from Bhogamukh to Moukhowa should be planned as a road-cum-bund which would act as a barrier and provide protection during floods. Such measures to develop the road network can help in improving the socio-economic condition of people. Due consideration needs to be given to the seismic design of all upcoming infrastructure in town to ensure that all new construction is earthquake safe. The Master Plan need to make careful consideration for disaster mitigation strategies at the city level with proper provisions for relief shelters, damage prevention, and rescue plans to improve the overall resilience of the town from multiple hazards.

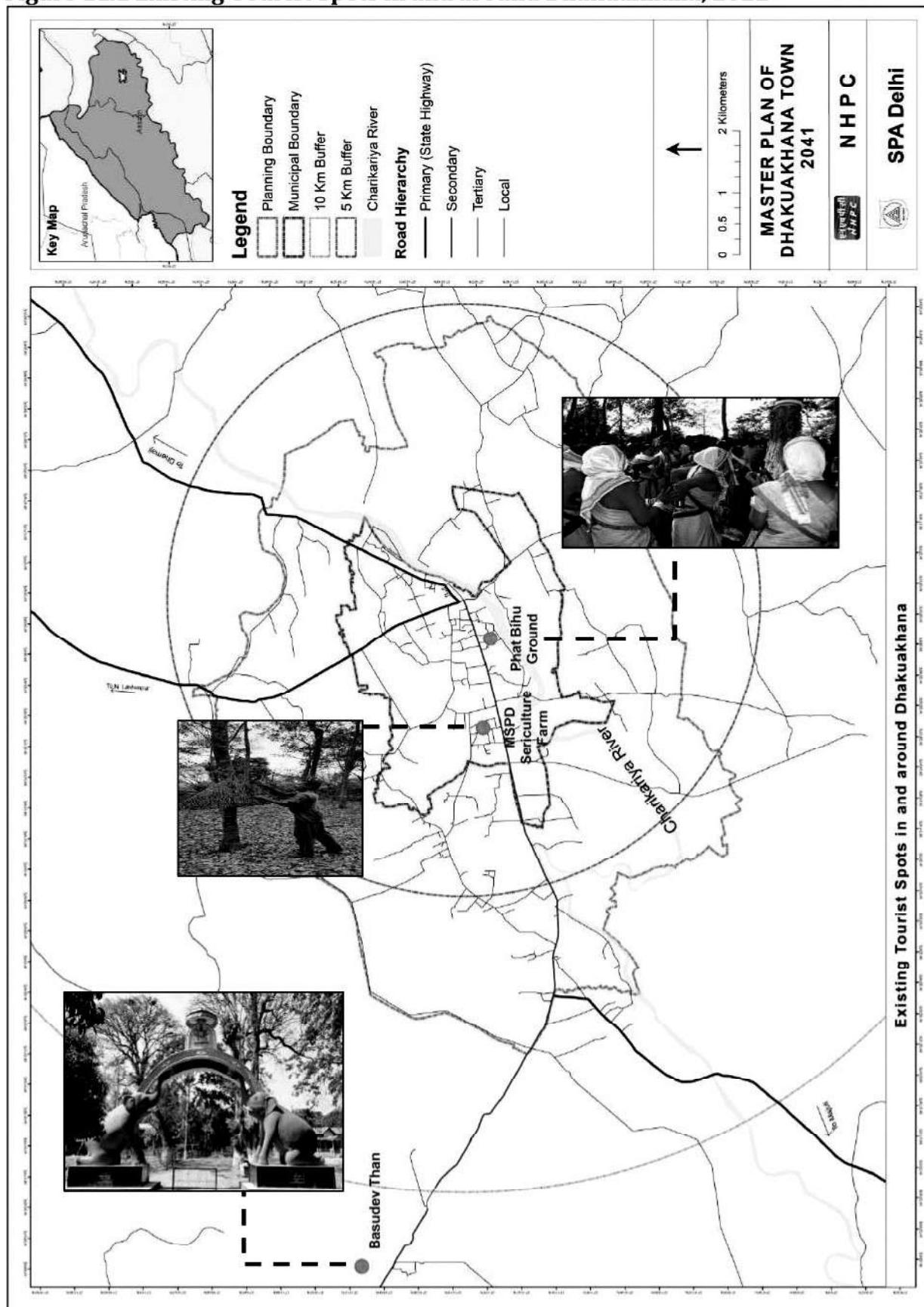
CHAPTER 11: TOURISM

11.1 Introduction

Dhakuakhana town is rich in natural beauty with lush green landscapes and meandering rivers flowing through it. Dense vegetation on the riversides with trees having large canopies and abundant shade is an abode of a variety of flora and fauna. Dhakuakhana is surrounded by Charikariya and Karha rivers, the serene babbling of which, meandering through the region, adds to the beauty of the unique folk music and tribal art of the town. Celebration of Ahom culture can be seen in various *Namghors* (local temples as well as socio-cultural spaces of the Ahom community) providing a completely immersive visual as well as a sensory experience. The mastery of traditional art forms by the local handloom and textile weavers of the Mising community is an added visual treat. Phat Bihu, a unique festival representing the cultural as well as the ethnic diversity of the state of Assam can be experienced in its most rustic and unadulterated form in Dhakuakhana Town alone. Basudev Than, another religious as well as historically important Ahom temple lies in close vicinity to the town, adding to its unique charm. Dhakuakhana lies in close vicinity to Majuli, the world's largest river island and a culturally rich abode of the Mising tribe famous for its vibrant mask making. However, all of this has not been enough to invite tourists to the region.

Tourism at unexplored local destinations in Assam has been growing in the past few years. However, the tourism potential of Dhakuakhana remains overshadowed by its historically important neighbours like Majuli, Sibsagar, and Dibrugarh. The Phat Bihu ground is the only spot in the town that witnesses a high amount of local as well as global tourist footfall. Even from the neighbouring regions, a negligible number of tourists visit in months other than April. Even for local recreation also there is no marked area or spot available within the town. While the town has a lot to offer the potential tourists, there are many challenges it needs to overcome first. There is a need for the development of recreation and tourism facilities in the town. To do that, an analysis of the existing situation and potential has been done in this chapter.

Figure 11.1 Existing Tourist Spots in and around Dhakuakhana, 2022



Source: Primary Survey, SPA Delhi (2022).

11.2 Heritage Tourism

Phat Bihu: Phat Bihu festival, a unique cultural pride of Dhakuakhana as well as the entire state of Assam, is celebrated at Mohghuli Chapor on the bank of River Charikariya every year. It is a unique kind of Bihu that is celebrated only in Dhakuakhana. The festival is celebrated during the month of May and people from all over Assam gather to celebrate it (see **Figure 11.2**). Although low in numbers, this festival even witnesses international tourist footfall due to its immense popularity and uniqueness. With the participation of all sections of the society, irrespective of caste and religions, various traditional events like Mukoli Bihu, Jeng Bihu, Toka Bihu, Mohila Bihu, and Gamosa competition are held during the celebration of the festival. Disseminating the message of harmony and solidarity, the Phat Bihu festival serves as the unique convergence of the ethnic cultures in Dhakuakhana. The festival, which is the symbol of the cultural identity and diversity of the people of Dhakuakhana, has been celebrated for years at the Phat Bihu Bakori as a week-long grand program. This area can be developed as a major tourist spot for the town with proper events, museums, food, and lodging facilities incorporating the culture of the various tribes of Dhakuakhana during the Phat Bihu season.

Figure 11.2: Celebration of Phat Bihu at Mohghuli Chapor in Dhakuakhana, 2021



Source: The Sentinel Assam (2022).

Various artisanal activities and workshops to provide a glimpse of the traditional weaving, handloom, and art styles of the town can also be exhibited here all year round.

It has the potential to become not just a large fairground but a proper art, music, and handloom pavilion.

Basudev Than: Basudev Than or Narua Satra is a Satra located in Dhakuakhana (see **Figure 11.3**). It was first established in the 14th century by the Chutia king Satyanarayan. Originally known as Laumura Satra, this Satra is well known in Assam and other parts of India as well. It is a representation of the unique Ahom culture and traditional Assamese architecture. The temple holds cultural as well as immense historical importance for the Ahom community. Ahom King Damodar Ata established this Satra in the 17th century as Laumura Satra. However, the plot of the temple, which was originally donated by Chutia king Satyanarayan, was transferred to many people many a times. This led to the name Na-rua which might mean 'to not stay' as the ownership did not stay with a single ruler. The name Basudev Than is related to the Assamese word for lord Vishnu- "Bakhudeo". It witnesses a large footfall of people from the town and nearby areas and can be developed as a potential tourist site.

Figure 11.3: Basudev Than in Dhakuakhana, 2022



Source: SPA, Delhi (2022).

Majuli: Majuli is a picturesque, lush green and clear-water river island in the river Brahmaputra. It is the world's largest river island, and it attracts tourists from all over

the world. Majuli lies merely 40 kilometres away from Dhakuakhana Town and is well connected with the town via the Dhakuakhana-Majuli road. Mostly inhabited by tribal communities, the culture of Majuli is rich with multiple tribal art forms; dance and music (see **Figure 11.4**). It is also called the cultural capital of Assam. Multiple festivals are celebrated here all around the year with people from all over the world in attendance. The main festival in the town of Majuli is called Raas which is a dance form wrapped in history and native "Sattriya" culture. This has been playing a pivotal role in binding together different ethnic groups of the region through the spread of religious ideologies of Neo-Vaishnavism and its cultural traditions since the 15th century. As the popularity of Majuli grows, it can be incorporated in Dhakuakhana tourism circuit and the tourist spots in the town can be developed accordingly.

Figure 11.4: Famous Masks and Dance of Majuli Island near Dhakuakhana



Source: <https://www.incredibleindia.org/content/incredibleindia/en/destinations/majuli.html>
(Incredible India, 2022)

11.3 Eco-tourism

Ecotourism is a kind of tourism that is an amalgamation of biotic components, natural environments, and touristic activities. The focus of ecotourism remains on enriching interpersonal experiences with environmental sustainability. It involves travel to places where diverse and unique flora, fauna, and cultural heritage are the major attractions.

Besides inculcating a sense of respect for the natural environments, ecotourism also aids in providing socio-economic benefits for the local communities of the tourist destinations. With the existing rich variety of flora, fauna, and virgin natural landscapes, the town has an untapped potential for interesting eco-tourism projects especially on the Charikariya and Karha riversides. Another potential site for this is the Muga Seed Development Project silk farm (see **Figure 11.5**). Tourists can be taken around the farm to experience the unique sericulture process which leads to the production of the town's famous "golden silk".

Figure 11.5: Large Scale Muga Sericulture Farm in Dhakuakhana, 2022



Source: SPA, Delhi (2022).

11.4 Rural Tourism

The various tribes and ethnic groups of the town have a variety of unique art forms, music, and cultural practices. There are rare and traditional art forms that are still

practiced and preserved by the tribes of the region. Tourists can be taken around to give them a glimpse of the traditional practices of the northeast especially the unique weaving and handloom art forms of Mising tribes along the Charikariya River.

11.5 Conclusions

While the state of Assam has witnessed a rise in tourism, the tourism potential of Dhakuakhana remains untapped yet. More popular neighbouring regions like Sibsagar and towns in Arunachal Pradesh steal the spotlight of the tourists. The few tourist spots that exist in the town are frequented mostly by the locals. The only non-local tourism that happens in Dhakuakhana is during the Phat Bihu celebrations. While the town does have the potential for tourism growth, there are many challenges it needs to overcome first. There is a need for the development of recreation and tourism facilities in the town. At Phat Bihu ground, more appealing tourism facilities need to be developed with a space for celebration as well as cultural exhibits.

More inviting and informative tourist trails and routes need to be developed to increase the appeal of picnic spots along the Charikariya River involving a glimpse of rural and tribal art forms into them. The annual fair which experiences a footfall of thousands of people needs to be organized in a way that the promotion of cultural and historical significance of the town gets highlighted to attract more tourists. The few lodging facilities available near the Chariyali area are in a poor condition. There is a need to develop more such lodging and accommodation facilities to make the stay of the tourists comfortable. The various tribes of the district have a variety of unique art forms, music, and cultural practices. These rare and traditional art forms which are still practiced and preserved by the tribes of the region need to be incorporated in promoting tourism in the entire region.

CHAPTER 12: GOVERNANCE

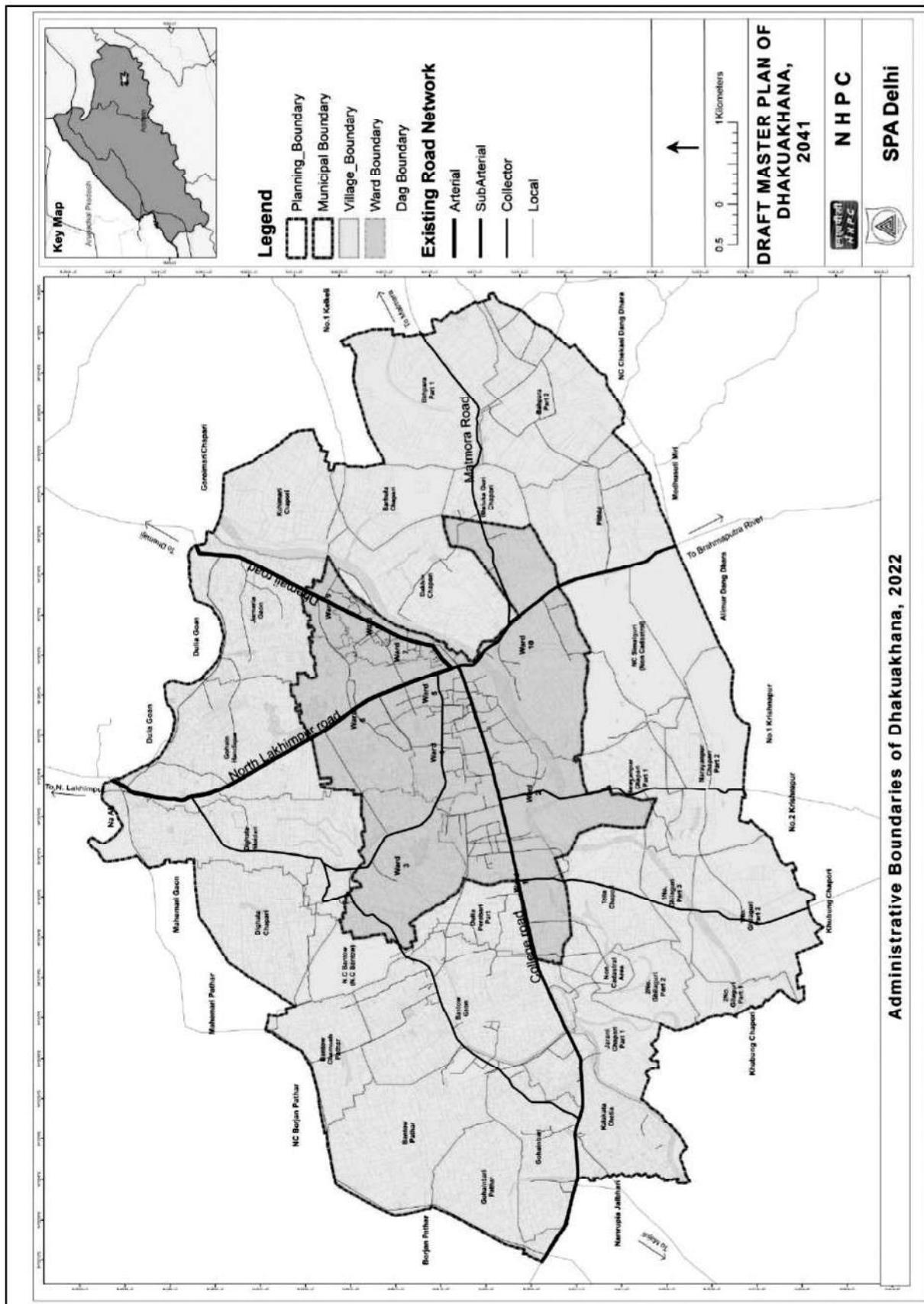
12.1 Introduction

Governance is the exercise of economic, political, and administrative authority to manage a country's affairs at all levels. It is defined as the process of decision-making and the process by which decisions are implemented (UNESCAP, 2015). It comprises the mechanisms, processes and institutions through which citizens and groups articulate their interests, exercise their legal rights, meet their obligations, and mitigate their differences. Governance may also be defined as the institutional structure, policy and decision-making processes and rules (formal and informal) related to issues of public concern which determine:

- How power is exercised
- How decisions are taken
- How citizens have their say

Various agencies are involved in planning and development of Blocks and Gram Panchayats. These institutions perform their role within specific jurisdiction defined by the state Government. Hence, it becomes imperative to understand the areas of influence of each agency; the interactions among various agencies; and their sector-wise accountability and the strength. The various sectors include public health, public welfare, public safety, public works, and others.

The planning area consists of the Dhakuakhana Municipal Area consisting of 10 wards and is surrounded by 28 villages as shown in **Figure 12.1**.

Figure 12.1: Administrative Boundaries of Dhakuakhana, 2022

Source: SPA, Delhi (2022).

12.2 Dhakuakhana Municipal Board

The Dhakuakhana Municipal Area spreads over an area of 13.78 sq.km with a total population of 13,502 as per 2011 Census. The Municipal Board was established in the year 2003. The following are the government offices in Dhakuakhana Municipal Board Area:

- Dhakuakhana Block Development Office
- Dhakuakhana Revenue Circle Office
- Dhakuakhana Water Resource Office
- Dhakuakhana Deputy Inspector Office
- Dhakuakhana Block Elementary Education Office
- Assam State Electricity Office
- BSNL Office

The organizational structure of Dhakuakhana Municipal Board is given below (see Table 12.1)

Table 12.1: Organizational Structure of Dhakuakhana Municipal Board

DESIGNATION	BRANCH NAME
Head Assistant cum Accountant	General Branch
Junior Assistant	
Chawkider	
Office Peon	
Sweeper	
Junior Engineer	Technical Branch
Tax Collector	
Electrician	Electrical Branch
Assistant Electrician	
Computer Assistant	General Branch

DESIGNATION	BRANCH NAME
Data Operator	
CPO-SBM (U)	SBM (U)
CPO-NULM	DAY - NULM
COP-PMAY-HFA-(U)	PMAY (U)
Driver	
Safai Karamchary	

Source: Dhakuakhana Municipal Board

12.3 Municipal Finance

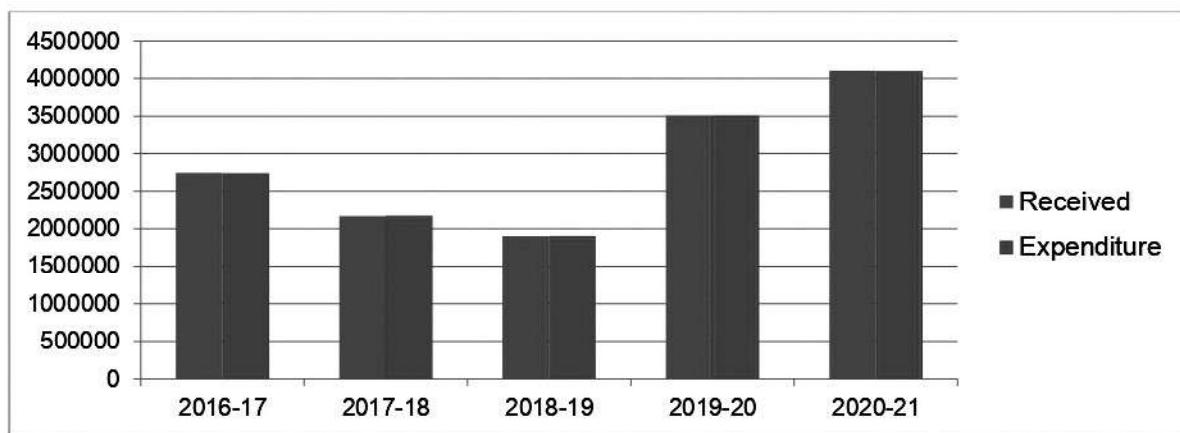
To carry out public services and maintenance of public amenities, the Dhakuakhana Municipal Board is vested with various functions including municipal finance involving management of revenues and capital finances. Municipal finance is divided into receipts and expenditure. The Dhakuakhana Municipal Board finance covers sources of revenue of the municipal government taxes (property, income, sales, and exercise taxes) user fees, and intergovernmental transfers. The following are the year wise fund received and expenditure of Dhakuakhana Municipal Board (**see Table 12.2 and Figure 12.2**).

Table 12.2: Fund Received and Expenditure of Own Revenue of Dhakuakhana Municipal Board, 2016-21

S. No.	Year	Amount of Fund Received in Rupees	Total Expenditure in Rupees	Balance in Rupees
1	2016-17	27,43,080	27,40,080	3,000
2	2017-18	21,65,632	21,67,632	1,000
3	2018-19	19,02,115	19,00,000	3,115
4	2019-20	35,09,845	35,09,000	3,960
5	2020-21	40,99,746	40,96,746	6,960

Source: Dhakuakhana Municipal Board

Figure 12.2: Fund Received and Expenditure of Own Revenue of Dhakuakhana Municipal Board, 2016-21



Source: SPA New Delhi (2022).

12.4 Schemes under Dhakuakhana Municipal Board

The following are the schemes under Dhakuakhana Municipal Board:

- Individual Household Latrine (IHHL) under Swachh Bharat Mission
- Community Toilet (CT) / Public Toilet (PT)
- IEC and PA campaigns
- Solid Waste Management and
- A/C Keeping Charge

The financial statement for the above-mentioned schemes is provided below in Table 12.3.

Table 12.3: Financial Statement for Schemes in Dhakuakhana Municipal Board

Component	Year	Fund Received	Fund Expenditure	Balance
IHHL	2016-17	3,26,000	-	3,26,000
	2017-18	7,98,700	-	11,24,700
	2018-19	38,44,800	27,91,652	21,77,848
	2019-20	1,05,40,800	90,53,203	36,65,445

Component	Year	Fund Received	Fund Expenditure	Balance
	2020-21	-	36,36,969	28,476
CT/PT	2016-17	-	-	-
	2017-18	-	-	-
	2018-19	1,43,736	-	1,43,736
	2019-20	1,17,600	1,16,100	1,45,236
	2020-21	-	1,34,118	11,118
IEC&PA	2016-17	1,65,000	-	1,65,000
	2017-18	66,500	1,65,000	66,500
	2018-19	243,721	-	3,10,221
	2019-20	243,721	-	553,942
	2020-21	24,372	2,850	5,75,464
Solid Waste Management	2016-17	-	-	-
	2017-18	-	-	-
	2018-19	22,28,666	1,52,000	20,76,666
	2019-20	1,00,000	10,00,000	11,76,666
	2020-21	21,17,700	8,60,800	24,33,566
A/C Keeping Charge	2016-17	-	632	632
	2017-18	-	649	1,281
	2018-19	-	649	1,930
	2019-20	-	649	2,579
	2020-21	-	649	3,228

Source: Dhakuakhana Municipal Board (2022).

12.5 National Urban Livelihoods Mission in Dhakuakhana Municipal Board

To reduce poverty and vulnerability of the urban poor households by enabling them to access gainful self-employment and skilled wage employment opportunities, resulting in an appreciable improvement in their livelihoods on a sustainable basis, through building strong grassroots level institutions of the poor. The mission would aim at providing shelters equipped with essential services to the urban homeless in a phased manner. In addition, the mission would also address livelihood concerns of the urban street vendors by facilitating access to suitable spaces, institutional credit, social security, and skills to the urban street vendors for accessing emerging market opportunities. The financial details of DAY-NULM in Dhakuakhana Municipal Board is given in below table (see Table 12.4).

Table 12.4: Financial Structure of DAY-NULM Scheme in Dhakuakhana Municipal Board

S. No.	Component Name	Year	Fund Received in Rupees	Fund Expenditure in Rupees	Balance in Rupees
1	SM&ID	2018-19	4,00,000	1,50,000	2,50,000
		2019-20	6,90,000	7,33,100	2,06,900
		2020-21	1,50,000	-	3,56,900
		2021-22	40,000	43,550	3,53,350
2	IEC	2018-19	10,000	-	10,000
		2019-20	10,000	-	20,000
		2020-21	15,000	7,610	27,390
		2021-22	-	21,600	5,790

S. No.	Component Name	Year	Fund Received in Rupees	Fund Expenditure in Rupees	Balance in Rupees
3	A&OE	2018-19	10,000	-	10,000
		2019-20	10,000	-	20,000
		2020-21	15,000	-	35,000
		2021-22	-	34,580	420

Source: Dhakuakhana Municipal Board (2022).

12.6 Conclusions

The Dhakuakhana Municipal Board governance system shows that there are some improvements in the governance of the town with developments taking place because of the support through central grants. However, the Board needs to strengthen its capacity by improving the overall organizational structure for the overall development of the area. Collection of revenues through taxes should be systematized to provide funds through budgets and proper management and auditing of the budget should be carried out on a regular basis, ensuring transparency and efficiency in the system. Good governance through use of digital technologies for redress of public grievances in relation to municipal works could present the first step. This can be implemented soon. Municipal Board must deliver proper services with equality and transparency.

CHAPTER 13: LAND USE

13.1 Introduction

Land Use Planning is a crucial aspect of the preparation of a sustainable and efficient Master Plan. Land use refers to the predominant use of lands such as residential, commercial, public semi-public areas, industrial, recreational, transportation, agricultural and eco-sensitive areas. In a Land Use Plan, different zones are defined for planning purposes. These zones delineate a single type of land use within the planning area based on the characteristics of that area. In this chapter, different types of land use will be discussed that exist in the Dhakuakhana Planning Area based on the existing land use classifications of URDPFI standards for GIS Based Master Plans.

13.2 Planning Area

Planning Area refers to the area that lies enclosed within the municipal boundary along with the adjoining villages whose development will be closely linked to the future development of the municipal area. 28 such villages have been identified and included in the Planning Area for the Dhakuakhana Master Plan, 2041. The area of these urban and rural regions has been given in **Table 13.1**.

Table 13.1: Delineation of Planning Area, 2041

S. No.	Planning Area	Area (sq km)
1.	Dhakuakhana Municipal Area	12.58
2.	Adjoining 28 Villages	48.66
3.	Dhakuakhana Planning Area	61.24

Source: SPA, New Delhi (2022).

13.3 Existing Land Use Distribution

Within the municipal area, total developed area is 3.17 sq km (25.18 percent) and undeveloped area is 9.42 sq km (74.82 percent). In the planning area, the developed area constitutes 6.85 sq. km which makes up 11.19 percent of the total planning area. Nearly 54.39 sq km (88.81 percent) of planning area is undeveloped land having only agriculture, water bodies and open areas as the predominant land use. The

predominant land use in the municipal area is agricultural which takes up 7.19 sq. km (57.15 percent). Agriculture is also the predominant land use in the entire planning area where it takes up 43.59 sq. km which is nearly 71.17 percent of the planning area. This is followed by residential land use which constitutes 1.59 sq km (12.62 percent) of the total municipal area. In the planning area, open green spaces and grasslands take up 8.10 sq. km which constitutes 13.23 percent of the total planning area (**see Table 13.2**).

Table 13.2: Land Use of Dhakuakhana, 2022

S. No	Existing Land Use	Municipal Area		Planning Area	
		Area (sq km)	Percent	Area (sq km)	Percent
1.	Residential	1.59	12.62	4.27	6.97
2.	Commercial	0.16	1.30	0.23	0.37
3.	Industry	0.00	0.00	0.00	0.00
4.	Public and Semi Public	0.79	6.31	1.04	1.70
5.	Recreational, Playground, Parks	0.16	1.25	0.18	0.30
6.	Roads	0.46	3.63	1.13	1.84
7.	Transportation	0.01	0.07	0.01	0.01
	Developed Area	3.17	25.18	6.85	11.19
8.	Agriculture	7.19	57.15	43.59	71.17
9.	Water Body	0.76	6.06	2.70	4.40
10.	Open Space and Grassland	1.46	11.62	8.10	13.23
	Undeveloped Area	9.42	74.82	54.39	88.81
	Total	12.58	100.00	61.24	100.00

Source: SPA Delhi (2022).

The total commercial area is 0.16 sq km which is 1.30 percent of the municipal area. In the planning area, commercial area constitutes 0.23 sq. km which is 0.37 percent of the

total planning area. Public Semi-public land use is 0.79 sq. km which is 6.31 percent of the total municipal area. In the planning area, Public and Semi-public land use takes up 1.04 sq km which is 1.70 percent of the planning area. Transportation land use is 0.01 sq. km which makes up 0.07 percent of total municipal area and 0.01 percent of the total planning area. Recreational/Playground/Parks within the municipal area take up 0.16 sq. km which is 1.25 percent of the municipal area and 0.18 percent of the planning area. There is no industrial land use within the municipal area. Water bodies take up 2.70 sq km which is 4.40 percent of total planning area (**see Table 13.2**).

13.3.1 Residential

Residential land use refers to the areas where housing is the predominant use on land. This has been demarcated using the colour yellow on the land use map. This land use category includes all the plotted developments, group housing complexes, apartments, slum- squatters, colonies, and rural settlements outside municipal boundary. In Dhakuakhana town plotted housing is the most predominant type of residential land use. There are no slum settlements in the town. Detached houses can be found in urban as well as rural areas. Most of the housing in town can be found near College Road, North Lakhimpur Road and Dhemaji Road. Ward 4, Ward 5, Ward 7, and Ward 8 have denser built-up areas compared to the rest of the wards. Ward 4 and Ward 5 have the most number of pucca houses with 2 stories. Ward 2 has a large share of Mising tribe, and their characteristic Sang Ghar type houses can be found in this ward near the banks of river Charikariya. Ward 7, Ward 8, Ward 9 and Ward 10 have a large number of Assam-type houses. Mixed-use residential areas can be found near town chariyali especially near Manik Bazaar, Daily Bazaar and Normal School. As per the URDPFI guidelines, 45-50 percent of land area should be under residential land use for small towns. This needs to be considered while formulating the proposals for increasing the residential areas for the master plan. In the planning area, Bantow Gaon, Dulia Perabari, Dighala Hiloidari, and Pithiyal villages have much more residential settlements as compared to rest of the villages in the planning area (**See Figure 13.1**).

13.3.2 Commercial

Commercial land use refers to the use of land which predominantly includes areas having trade and commerce activities, businesses, shops, market areas, shopping complexes, convenience shopping, mandis and informal markets. In Dhakuakhana,

commercial areas are located along the major roads of town such as College Road, Matmora road and North Lakhimpur road. The main commercial areas of the town are Manik Bazaar and Daily Bazaar which are located at the Town Chariyali on College Road and Matmora Road, respectively. These market areas add to the congestion along these major roads because of narrow roads and lack of proper parking spaces. A few hotels are also present in Manik Bazaar, Daily Bazaar and Town Chariyali. The total commercial land use in the planning area is 0.23 sq. km (**See Figure 13.1**). As per URDPFI guidelines 2-3 percent of the land use area must be demarcated under commercial land use in small towns.

13.3.3 Public-Semi Public

Public-Semi-public land use includes educational, healthcare, religious, government offices, post offices, police stations, socio-culture buildings, and utilities such as cremation, solid waste disposal site, STP, water storage facilities, treatment plants and electric sub stations. In Dhakuakhana, most of the administrative facilities are located along the college and ward 1, 2, and 4 in the centre of the city. Important government offices and departments like Water Resources Department Office, Municipal Board Office, Revenue Circle Office, Forest, and Soil Conservation Department Office, MSPD Office, Irrigation Department Office, Food Supplies Office, BSNL Office, Block Health Department Office, Block Development Office, ASPDCL Office, and Agriculture Office are all located around College Road, forming the main administrative hub of Dhakuakhana. In the planning area, major public and semi-public facilities like the district court, circuit house and SDO Civil office are in the Bantow Pathar village. The major educational institutes are also located along College Road, North Lakhimpur Road and Dhemaji Road. The Block Elementary Education Office is located along with a primary school near Dhemaji Road. Central School, Jatiya Vidyalaya, Dhakuakhana Girls Junior College, Dhakuakhana Commerce College, Dhakuakhana Collegiate High School, St, Thomas School, Shankar Dev Shishu Niketan, Sahdev Hindi L.P School and Ideal Mission Schools are some of the major primary, secondary and senior secondary education institutes in Dhakuakhana. Apart from these, there are three colleges in the town for higher education. Dhakuakhana College is the major college of the town which offers various courses for science, commerce, and humanities. Apart from this B.Ed. College located in are Lakhimpur Girls College, North Lakhimpur Autonomous College near old college

road in the upper side of NH 15 in western side of the town. Lakhimpur B. Ed. College located in Ward 6 and Normal School located in Ward 10 offer degree and diploma courses in education.

In terms of healthcare facilities, the town has one District hospital named as Dhakuakhana Civil Hospital. It is proposed to be converted into a sub-divisional hospital soon. The Civil Hospital is in Ward 2 in close proximity to College Road. Apart from this, one Veterinary Hospital is also located along College Road. There are a few private clinics in the town, which are located along College Road and Matmara Road.

Many religious facilities are interspersed all along the planning area. Each inhabited village in the planning area has atleast one temple or *namghor*. Apart from places of worship for Ahom Community, there is one Jain Mandir as well as a Mosque located along Dhemaji road in Ward 7. There is one Police Station in the municipal area located in Ward 7 right next to Town Chariyali. One fire station is in Ward 2 near the Block Development Office on College Road. Other utilities such as one cremation ground and one dumping site are in Ward 10 and Ward 2, respectively. One post office is also located along the College Road (**See Figure 13.1**). Land use under Public and Semi-Public area should be 6-8 percent in small towns, as per URDPFI guidelines.

13.3.4 Recreational

Recreational facilities include parks, playgrounds, stadiums, and multi-purposed open areas. At present, as one public park, eleven playgrounds and one mini stadium is present in the planning area. There is also one Phat Bihu ground in Mahughuli Chapor Village in Ward 2. One Eid Ground is also located alongside the mosque in Ward 7. As per URDPFI guidelines, Recreational Land use needs to be 12-14 percent of the total area in small towns (**See Figure 13.1**).

13.3.5 Industrial

Industrial land use includes all the large, micro, and medium and household industries. As per the URDPFI guidelines, 8-10 percent area should be designated for industrial land use in small towns. At present, there are no industries in the planning area of Dhakuakhana (**See Figure 13.1**).

13.3.6 Transportation

Transportation Land Use includes all the roads (arterial, sub-arterial, collector and local roads), railway stations, bus stands, and airports. In Dhakuakhana, there are two bus stations, both of which are located along Matmora Road in Ward 10. One of the bus stations is the A.S.T.C Bus Stand and the other one is a private bus stand. There are no railway stations, airports, ISBTs and ferry services in the planning area. As per URDPFI guidelines 10-12 percent of area should be demarcated for Transportation land use in small towns (**See Figure 13.1**).

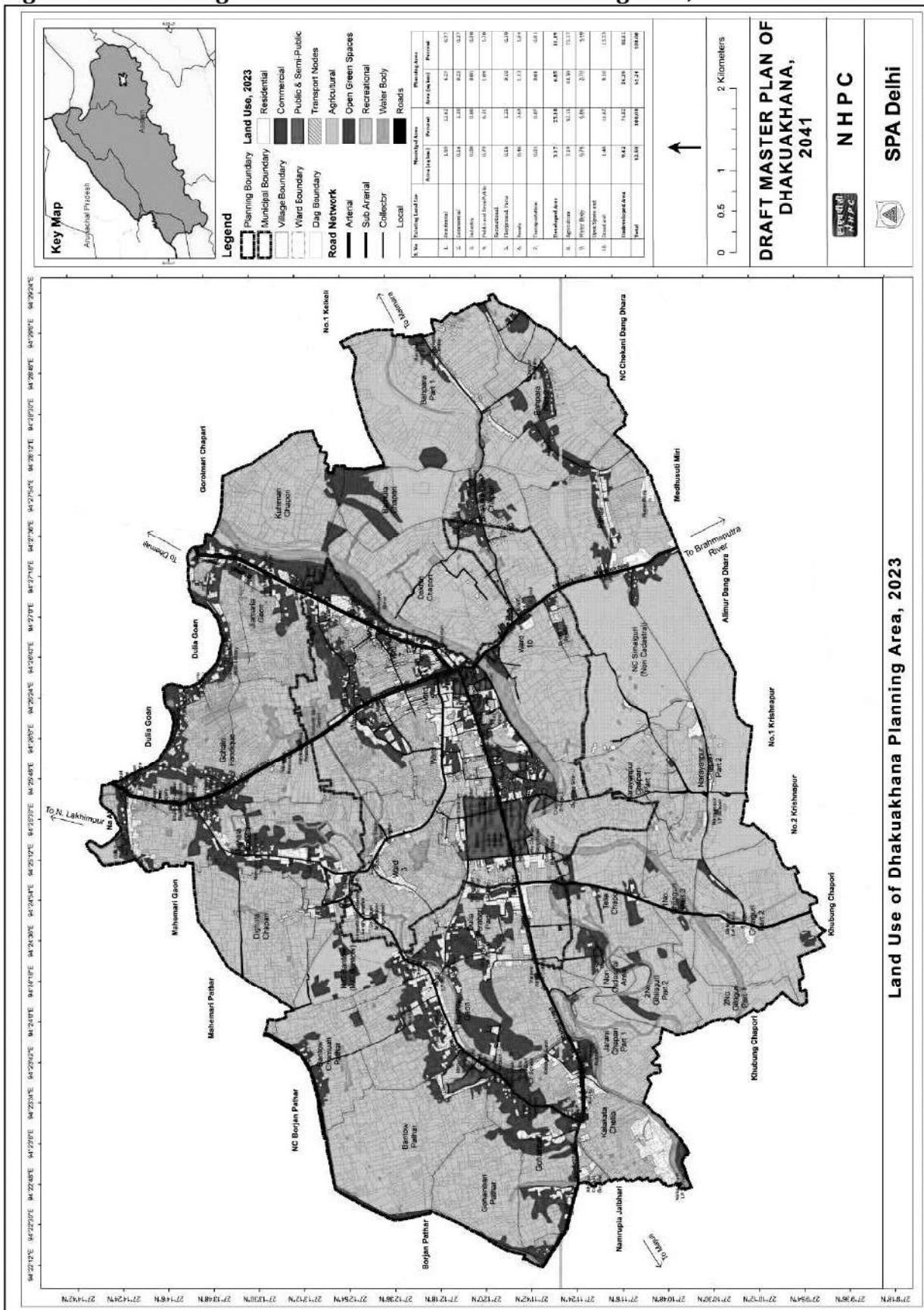
13.3.7 Agriculture

Agriculture is the backbone of the economy of the region. Agriculture land use is predominant not only in the rural areas but also in the municipal area of Dhakuakhana. Rice, Corn and Mustard are the main crops grown in the planning area (**See Figure 13.1**).

13.3.8 Water Bodies

Charikariya River is the major water body in the planning area. It passes through ward 10 and 2 of the municipal area as well. Apart from this, many private ponds are located alongside individual houses in planning as well as municipal area. Fisheries are maintained in many of these private ponds. Apart from this, marshes and small wetlands are also interspersed all along the planning area in a small number (**See Figure 13.1**).

Figure 13.1: Existing Land Use of Dhakuakhana Planning Area, 2022



CHAPTER 14: ISSUES AND POTENTIAL

14.1 Demography

14.1.1 Issues

Dhakuakhana decadal population growth rate has slightly decreased from 2001 to 2011, which is a result of the out-migration driven by the dearth of employment opportunities in this area. Town area continues to retain its rural character and there is immense scope for development in terms of infrastructure, utilities, and services.

14.1.2 Potential

The literacy rate increased from 76.4 percent in 1991 to 89.1 percent in 2011. Rate of workforce participation increased from 32.4 percent to 40.4 percent between 1991 and 2011. More than 55 percent of the workers are 'other workers' indicating that most of the local workforce is employed in secondary and tertiary economic activities. Town's sex ratio has increased from 1991 to 2011 along with the increase in the female literacy rate, which is greater than that for males, opening opportunities for women to take part in economic activities.

14.2 Economy

14.2.1 Issues

Dhakuakhana town suffers from a lack of industrial growth. Unemployment results from the town's lack of industry. Due to a complete lack of food processing enterprises, agricultural output cannot be exploited to its full economic potential. The sericulture industry is also unable to generate sufficient economic prospects owing to a lack of effective skill development, awareness, and training among the population, as well as a market for the output.

14.2.2 Potential

Rice, mustard, and silk are the primary products of Dhakuakhana town. The sericulture farms contributes significantly to the town's GDP.

14.3 Housing and Slums

14.3.1 Issues

A small percentage of the households are in a dilapidated condition for which there is a need for renovation of these houses to improve their existing conditions.

14.3.2 Potential

The maximum houses are either in a good or liveable condition keeping in mind their quality and usability.

14.4 Traffic and Transportation

14.4.1 Issues

Town typically lacks an appropriate road hierarchy and scope of expansion. The connectivity of Dhakuakhana Planning Area is also difficult from various other important towns as there is no provision of Railway connectivity.

14.4.2 Potential

Dhakuakhana is connected to major towns like Gogamukh, Dhemaji, North Lakhimpur, Majuli, Silapathar, and Dibrugarh via Dhemaji provides an essential link for the transportation of freight and everyday passengers.

14.5 Water Supply and Drainage

14.5.1 Issues

Dhakuakhana town needs extensive development in the field of potable water supply as continuous dependency on ground water may lead to reduction of water tables. Quality of ground water is reported to be high on iron concentration which may lead to health issues. There is a need for effective drainage network as the existing drains are in very poor condition resulting in Water logging issues in many areas.

14.6 Sanitation

14.6.1 Issues

There is a requirement of one Faecal Sludge Treatment Plant for the treatment of night soil which is now disposed openly.

14.6.2 Potential

After introduction of Swachh Bharat Mission in 2015, drastic improvement has been noticed within the town has been declared open Defecation free.

14.7 Solid Waste Management and Electricity

14.7.1 Issues

Solid Waste Management needs special attention in Dhakuakhana town as the methodology used for the disposal of solid waste is unscientific and generally incineration is the most prominent method. Current waste dump site is only 85 metres from Charikariya River which can lead to pollution of river body hence, relocation of the dumpsite is necessary.

14.7.2 Potential

Power sector has noticed significant development as during 2011, only 65 percent of households were electrified which increased to 100 percent during 2022. Total electricity demand was 7.2 Megawatt for year 2021.

14.8 Social Infrastructure

14.8.1 Issues

EDUCATION: Quality of infrastructure in schools is not good. The town severely lacks higher educational institutions in science, engineering, management, and medical fields.

HEALTH: Healthcare facilities are extremely poor in terms of both availability and hygienic condition.

RECREATION: For recreational facilities more housing area parks and playgrounds are required as per URDPFI guidelines.

14.9 Environment and Disaster

14.9.1 Issues

Dhakuakhana is a multi-hazard prone area with Erosion from the River Charikariya and Karha being major one of the major issues in town. The area also lies in high seismic risk zone (zone 5) making it highly vulnerable to earthquakes.

14.10 Tourism

14.10.1 Issues

There is a need for the development of recreation and tourism facilities in the town. There is a need to develop more such lodging and accommodation facilities to make the stay of the tourists comfortable.

14.10.2 Potential

The appeal of picnic spots along the Charikariya River along with involving a glimpse of rural and tribal art forms into them which are still practiced and preserved have a potential to be developed into a prominent tourist spot.

14.11 Governance

14.11.1 Issues

The Municipal Board needs to strengthen its capacity by improving the overall organizational structure for the overall development of the area. Collection of revenues through taxes should be systematized to provide funds through budgets and proper management and auditing of the budget should be carried out on a regular basis, ensuring transparency and efficiency in the system.

**PLANNING AND DEVELOPMENT
PROPOSAL**

CHAPTER 15: POPULATION PROJECTIONS

15.1 Introduction

One of the primary considerations for planning an urban settlement is population projections as it forms the basis for allocating land for all other land uses as well as provisioning of social and physical infrastructure. Total requirements for the provisioning of developed land for various uses like residential, commercial, traffic and transportation, industrial, public, and semi-public spaces, green spaces, etc. and educational, health and socio-cultural facilities is computed on the basis of population projections for a planning period or master plan horizon period, which is 2041 in the case of Master Plan for Dhakuakhana. Hence it is necessary to have credible projections to avoid deficiencies or excess provisioning of developed land and facilities and infrastructure for the next 20 years.

There are several population projection methods such as arithmetic projection method, logistic projection method, geometric projection method, exponential projection, cohort projection method, etc. In case of Dhakuakhana Planning Area, past population growth trends are taken into considerations for making population projections. The approach for the calculation of projected population is different for town and rural areas of planning area as decadal growth in Dhakuakhana town is 37.2 percent between census year of 1991 to 2001 and 34.84 percent between census years of 2001 to 2011 respectively (**see Table 15.1**). Therefore, to calculate the growth of population within Municipal boundary, geometric projection method has been utilized. For the projection of rural population, as the rural population has increased by 9.36 percent between census year 1991 to 2001 and decreased by 2.2 percent for year 2001 to 2011, Arithmetic projection method has been used, as using geometric method for population growth will does not have any definitive projection.

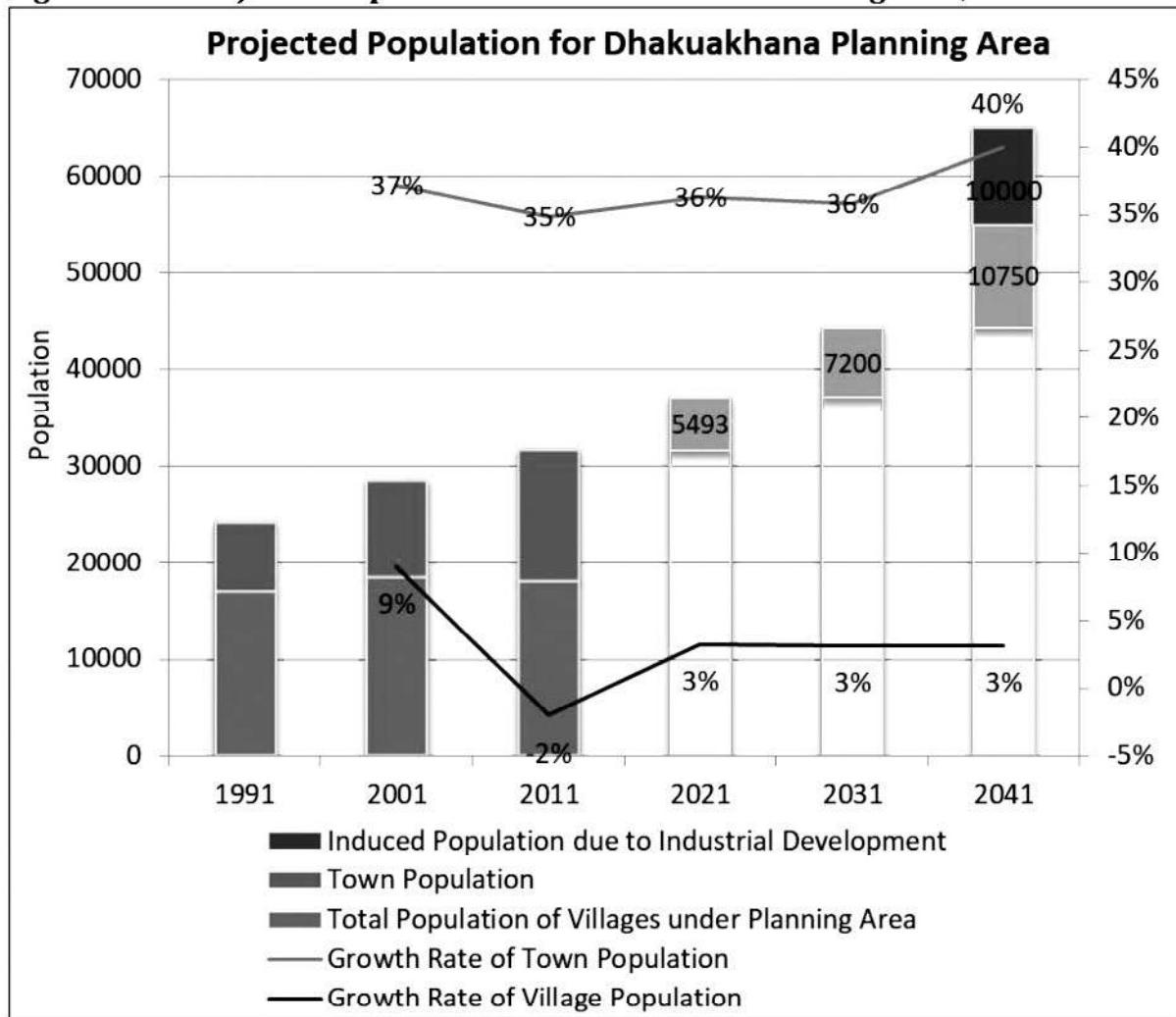
Table 15.1: Population Projection for Dhakuakhana Planning Area, 2041

Year	Projection of Town Population by Geometric Method				Projection of Rural Population by Arithmetic Method						
	Population of Town	Increment	Growth Rate (in percent)	Geometric Mean (in percent)	Projected population (Actual)	Estimated	Rural Population within Planning Area	Increment/Decrement	Arithmetic Mean	Projected population (Actual)	Estimated
1991	7,298						16,880				
2001	10,013	2,715	37	36			18,460	1,580	588		
2011	13,502	3,489	35				18,055	-405			
2021					18,362	18,400				18,643	18,650
2031					24,973	25,000				19,238	19,250
2041					33,964	35,000				19,838	20,000
1. Projected Population (Projected Town population + Projected rural population) = 55,000											
2. Induced Industrial Population: 10,000											
Total Projected Population for Dhakuakhana Planning Area (1+2)= 65,000											

Source: SPA New Delhi (2022).

Population trends for Dhakuakhana Planning Area have been discussed in Chapter 2. As population growth for Dhakuakhana town is 3.6 percent per annum, geometric projection method has been used and the projected population for 2021 is 18,362 which is rounded to 18,400. The projected population for 2041 is calculated to be 33,964 which is corrected to 35,000 (see Table 15.1).

For projection of population in planning area apart from town, arithmetic mean has been calculated as 588, hence projected population for 2021 is calculated as 18,643 which is rounded to 18,650, similarly; projected population for 2041 is calculated as 19,838 which is corrected to 20,000. Therefore, total projected population for planning area, which is combination of both rural and urban population projection, is calculated to be 55,000 (see Table 15.1).

Figure 15.1: Projected Population for Dhakuakhana Planning Area, 2041

Source: SPA New Delhi (2022).

Inclusion of industrial development in Dhakuakhana planning area will attract additional 6 percent increase in projected population on decadal basis or 18 percent till 2041 which is calculated as 10,000. The decadal growth in population between year 2011 to 2021 is estimated to be 5,493, for 2021-31 it is estimated to be 7,200 and for year 2031-41 the estimated growth in population will be 10,750. Hence the total projected population for Dhakuakhana planning area is 65,000 (see Figure 15.1).

CHAPTER 16: PROPOSAL FOR HOUSING AND HABITAT

16.1 Introduction

Shelter is the most crucial element amongst the basic fundamental needs of living along with food and cloth. Housing encompasses more than just construction; it also concerns developing resilient communities with facilities that are necessary, like access to roads, drainage, water supply, and sanitation, social comforts, leisure, and livelihood. The Master Plan for Dhakuakhana, 2041 anticipates providing a dwelling to each household by 2041, using an inclusive planning approach. The master plan of Dhakuakhana further aims at providing liveable housing with the necessary infrastructure and amenities to every resident in a community. The proposals are flexible enough to consider changes in housing diversity over time as communities grow.

Residential land allocation, urban regeneration and re-densification projects, public housing, encouraging private participation through incentives, and so on are all examples of planning strategies that aim to provide affordable housing to all. Further, central government flagship project i.e., PMAY U would facilitate in providing affordable housing options within the planning area of Dhakuakhana.

16.2 Housing Requirement Assessment

Housing demand is assessed for the horizon year 2041 as shown in **Table 16.1**. The anticipated housing requirement in 2021 is 8,420 dwellings, with just 6,999 housing stocks available. In 2031, the overall housing shortage will be 3,536 homes. Finally, if current trends continue, the overall housing shortfall will be roughly 14,396 dwellings by 2041. To fill this housing deficit, 5,500 houses are planned in the first decade, 2021-31, and 8,896 dwellings are proposed in 2041 to meet the housing need. It is assumed that there will be decrease in family size with more nuclear families residing in the planning area seeking economic opportunities.

Table 16.1: Housing Assessment for Dhakuakhana, 2041

Aspects	2021	2031	2041
Population	37,050	44,250	65,000
Family Size	4.4	4.2	4.1
Projected Housing need	8,420	10,535	21,395

Aspects	2021	2031	2041
Available Housing Stock	6,999	6,999	6,999
Housing Gap	1,421	3,536	14,396
Housing Supply	0	5,500	8,896

Source: SPA New Delhi (2022).

Reasonably large residential plot sizes are proposed for all families of different economic classes as shown in **Table 16.2**. Since developed land could be easily made available no group housing is proposed. Only limited group housing can be provided for larger plots for the government housing projects or limited new developments.

Table 16.2: Plot Sizes for Different Economic Classes

S. No.	Economic Class	Percent of Population in Each Economic Class	Plot Sizes in sq m
1.	Economically Weaker Sections	30	50-100
2.	Low Income Groups	25	100-200
3.	Middle Income Groups – I	25	200-300
4.	Middle Income Groups – II	10	300-400
5.	High Income Groups – I	5	400-500
6.	High Income Groups – II	5	500-600

Note: Land for residential use is calculated based on higher side of each plot range.

Plotted housing is expected to be the prevalent dwelling form in the Planning Area. The projected land use section discusses the land needed for housing. It is also estimated that 55 percent of the population belongs to the EWS and LIG categories, 45 percent to the MIG category (25 percent MIG-I and 10 percent MIG-II categories), and 10 percent to the HIG category, with 5 percent belonging to HIG-I and 5 percent belonging to HIG-II.

Spatial allocation of land for different land uses is based on a specific approach. This approach seeks to first allocate vacant lands within the municipal area for development. Once vacant municipal lands are exhausted, land within the planning area is proposed for further use.

As far as housing is concerned, the Master Plan for Dhakuakhana, 2041 has made spatial allocations of residential land for housing, which is situated in the municipal area and adjacent to important roads in planning area.

16.3 Residential area and density distribution

As per the outcomes of the analysis it is inferred that within the town council ward 5,7,8, and 9 has the gross density equals to and more than 22 person per hectare. Whereas the gross average population density in Dhakuakhana town is 10.7 persons per hectare (as per census 2011) which is higher than the population density of Lakhimpur district, that is, 4.57 persons per hectare (as per census 2011). The gross residential density as per 2011 census was 78 person per hectare (**see Table 16.3**). To enhance the existing condition of the houses and reduce the infrastructure dependency, it is proposed that the gross density of the existing residential areas to be less than 80 person per hectare.

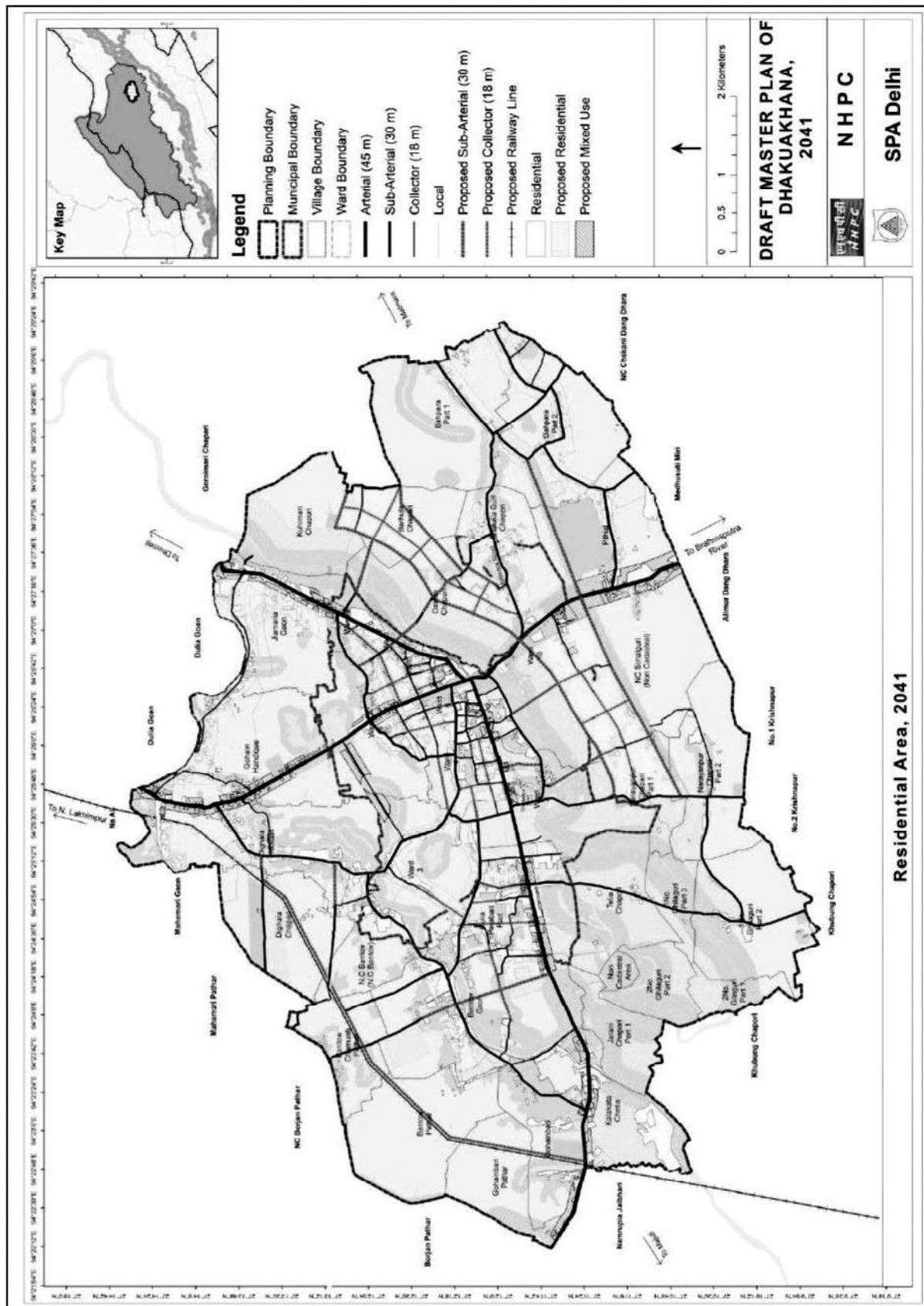
Table 16.3: Population, Density and Residential area Distribution, 2041

S. No	Type of Development	Area in Hectare	Population	Density in pph
1.	Existing residential	403.64	31,557	78.18
2.	Proposed residential	724.51	23,410	32.31
3.	Proposed mix use	121.71	10,033	82.43
Total/ Average		1,249.86	65,000	64.30

Source: SPA New Delhi (2022).

Moreover, Dhakuakhana is to be developed as an economic centre, it is more likely that there will be huge migrant population. So, to accommodate additional population of 33,443 including migrants and natural growth, new residential area and mix use areas are proposed. The population density of proposed residential area for 2041 will be less than 50 persons per hectare. And a population density of around 82 population per hectares is proposed for proposed mixed use areas (**see Table 16.3**).

Figure 16.1: Proposed Residential Area in Dhakuakhana Planning Area, 2041



Source: SPA New Delhi,(2022).

CHAPTER 17: PROPOSAL FOR ECONOMY

17.1 Introduction

An urban settlement's economy is its backbone. A thriving economy is depending on expanding and diversified industries, trade, and commerce. It does, however, rely on highly trained human labor endowed with the abilities required by modern industrial, commercial, and trade processes. The abundance of locally available raw resources at relatively low prices may increase the likelihood of rapid economic expansion. The following proposals are produced based on these criteria as examined in the preceding section of the Master Plan for Dhakuakhana, 2041.

17.2 Area Distribution

The commercial area in Dhakuakhana accounts to 0.26% of the total existing planning area (61.24 sq km). As per URDPFI guidelines 2-3 percent of the land use area must be demarcated under commercial land use in small towns. Thus, a total of 1.09 sq km or 4.49% of developable area of land is dedicated under commercial land use. This commercial activity can be further bifurcated into wholesale, retail formal and informal markets. Other than this, mixed use commercial activities are to be proposed along all the major roads.

At present there are no industries in Dhakuakhana. 30 hectares of industrial area (two plots 15 hectares each) are proposed in the planning area for mainly agro-based industries. Thus, proposed industrial area accounts to 1.24% of the total developable area.

17.3 Workforce Participation Rate

As per Census of India 2011, the total number of workers is 12,614 within a total population of 31,557. That is existing workforce participation rate is 40.0% which expected to remain the same till 2041. Thus in 2041, for a total projected population 65,000 considering workforce participation rate as 40%, the total number of workers would be 29,250. These workers will be engaged in primary, secondary and tertiary sectors as defined below:

Primary Sector – Activities based directly on natural resources like agriculture

Secondary Sector – Activities based on processing of raw materials and manufacturing i.e., industries.

Tertiary Sector – It covers a wide range of activities from commerce to administration, transport, financial and real estate activities, business and personal services, education, health, and social work.

17.4 Primary Sector

50% of the total workforce is in primary sector which are to be classified as follows:

17.4.1 Agriculture and Allied Activities

Agriculture sector is an important part of Dhakuakhana's economy. This sector includes agricultural, animal husbandry and forestry activities. Within the composition of this sector a major change is taking place. In 2011, only 47 percent of population was engaged in agriculture. Main reasons for this decline were the frequent flooding, lack of irrigation, and unavailability of open markets to sell the produce. To further enhance farmer incomes, commercial crops are proposed to be grown within the planning area. Government incentives are proposed in the initial stages of town development.

Since major crops produced in Dhakuakhana are mustard and rice, it should be proposed to use for trading purposes as in present condition it is only used for personal use. Well irrigation system to be proposed for agricultural lands as in present condition only 5.18 percent of the agricultural lands are irrigated and the rest are dependent on rainfall for irrigation.

17.4.2 Pisciculture

Unemployed youth may be employed in Pisciculture under various government schemes. Awareness on better management practices and proper marketing channels are required for better production and increase in economy.

17.4.3 Sericulture

The sericulture industry, which contributes significantly to the town's GDP, is also unable to generate sufficient economic prospects owing to a lack of effective skill development, awareness, and training among the population, as well as a market for the output. Dhakuakhana town has a potential to produce 126 metric tonnes of raw silk.

This is proposed to be utilized at its best under Muga Mission and Rurban Mission to boost the economy.

17.5 Secondary Sector

Industries are enablers of economic development and employment generation for any urban settlement. Dhakuakhana Planning Area has remained devoid of industrial development far too long as shown in the analysis. Hardly there is any industry except a few small-scale rice mills presently located in the south of the existing planning area.

Dhakuakhana has a major muga silk production and skilled workforce trained in weaving and handloom. Hence there is a potential for the development of silk-based handloom industries. Moreover, there is a huge workforce indulged in agricultural practices so, food processing industrial are further proposed to uplift the agriculture produces within and across Dhakuakhana planning area. Master Plan for Dhakuakhana, 2041 proposes that a package of special incentives should be given by the Government of Assam for the development of small and medium scale handloom, agro and food processing industries. These industries could use raw materials which are currently being exported out of the district. According to the projected land use, the industrial sector accounts for almost 5 percent of the overall planning area. The master plan offers 7.5 hectares of land for agro-based industries in Gohain Bari Chapor village to the west of the municipal territory, along the College Road, 7.5 hectare of land for agro-based industry in Ward 10 and Pithiyal village and 15 hectares of land for handloom and textile industries in Dighala chapari village to the north of the municipal area. Because both planned industrial areas are well connected by road and rail, it is a suitable spatial location for the effective operation of the proposed industrial zones. These industrial areas will also attract workforce which is 20% of the total workforce participation rate in 2041.

17.6 Tertiary Sector

The remaining 30% of workforce is in tertiary sector in retail and wholesale commerce and informal markets as shown below:

17.6.1 Trade and Commerce

Master Plan for Dhakuakhana, 2041 aims to maintain as well as enhance economic growth in planning area by developing it as a commercial and tourist hub. For the development of trade and commerce activities, there is a need to rejuvenate and redevelop the existing commercial area with better accessibility and parking spaces, and allocation of additional area for commerce. Central location and high accessibility would facilitate fast development of the commercial hub in Dhakuakhana planning area and will generate additional revenues for the government. Additional revenues are needed for continual maintenance of the town by the municipality, which is not possible with the current low tax base.

As properly planned modern commercial hub gets developed, and more people begin to visit the town centre, more parking spaces would be required. It is proposed that parking places are built within commercial complexes.

17.6.2 Informal Markets

Master Plan for Dhakuakhana, 2041 seeks to promote inclusive economic development. So, the master plan makes provisions for safeguarding the interests of street vendors, vegetable vendors, and fruit vendors. So, a land measuring 1 hectare has been proposed as a vending zone near Tiniali junction where the old ASTC Bus stand was located. Since the Master Plan proposes to relocate this bus stand and vacant land is available behind this bus stand, this area can be transformed into a retail market for vegetables and fruits for the local community. Located near the City Centre, the vending zone would be easily accessible. It can be developed in a phased manner as an attempt to protect the interests of the vulnerable sections of the community.

Thus, the proposed economic centers in Dhakuakhana Planning Area 2041 have been shown below in **Figure 17.1**.

17.6.3 Street Vending Zone

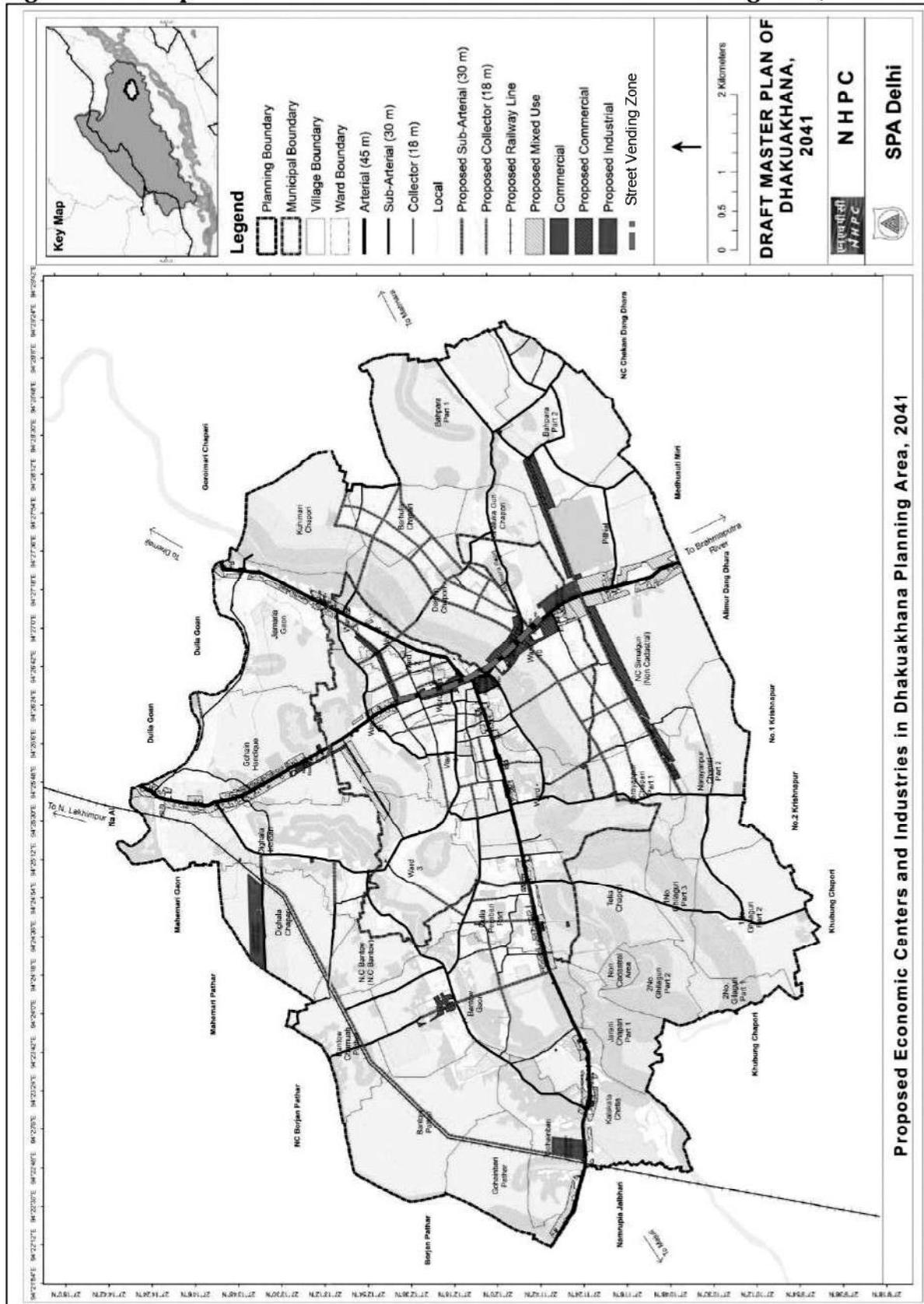
Restricted vending zones (see Error! Reference source not found.) shall be linked up with the road width. Some indicative norms, which may be considered, are as follows:

- i. Street vending can be provided only on both sides of 60m Arterial Road, within the Multi-utility zone.

- ii. The number of street vendors shall be decided by considering the holding capacity of each designated vending area on such a road.

No vending within 50 meters from any crossing of two or more roads on all sides, both sides of the railway crossing and any declared heritage structure by the local authority.

Figure 17.1 Proposed Economic Centers in Dhakuakhana Planning Area, 2041



Source: SPA New Delhi (2022)

CHAPTER 18: PROPOSAL FOR TRAFFIC AND TRANSPORTATION

18.1 Introduction

An adequate and effective traffic and transportation infrastructure ensures efficient spatial linkages between various land uses and activity systems. Mobility is a crucial factor that determines not only the magnitude of expansion or contraction of urban communities but their direction as well. Congested cities, with residents experiencing delays for hours on end in traffic, do little to stimulate economic progress. Towns with excellent public transportation networks sustain economic growth and significantly improve the standard of living for their residents. As the nature of development in a region changes spatiotemporally, the mobility demands of the area also witness a simultaneous change. It, therefore, becomes quintessential to not only predict these demands, but also to come up with optimal solutions for their successful implementation. Considering all these factors, the proposals for traffic and transportation are divided into short-term and long-term plans to address the diverse mobility-related needs of the Dhakuakhana planning area. Short-term plans address urgent issues that must be resolved to eliminate congestion and traffic jams in the core areas of Dhakuakhana. Long-term plans concentrate on facilitating necessary transportation infrastructure to support the region's efficient traffic flow, comprehensive mobility, and connectivity to neighbouring regions.

18.2 Short-Term Proposals

18.2.1 Off-street Parking

The findings of parking surveys conducted on Dhakuakhana Town's main arterial and sub-arterial roads show that the current parking provisions in terms of off-street parking are inadequate. The number of parking spots currently available remain completely occupied at all times often leading to increase on-street parking in undesignated spots all along the main road. This issue is especially prevalent in commercial areas like Manik Bazaar and Daily Market. Parking accumulation varies between 90% and 95%. On-street parking in undesignated spots also forms the main cause of reduced road capacity and traffic congestion. Since the master plan of

Dhakuakhana has proposed more commercial facilities in the core areas, the parking demand is bound to increase. Keeping the above-mentioned issues in mind, the Master Plan for Dhakuakhana, 2041 proposes off-street parking lots to be constructed in the required capacity along with all upcoming commercial and public-semi-public establishments that are bound to witness heavy footfall in the future. Urban Design interventions also need to be made along all the proposed arterial; and sub-arterial roads, to separate the carriageways from existing off-street parking areas. The existing private bus stand needs to be shifted from near Daily Bazaar to a new proposed location in the periphery of the town. Similarly, it has been proposed that the existing cremation ground near the main arterial road to Matmora will also be shifted to a new location. The vacated sites for the existing private bus stand and cremation ground are proposed to be converted into dedicated parking spaces for a minimum of 500 ECS to facilitate off-street parking for the core commercial areas (**see Table 18.1**).

Table 18.1: Proposals for Off-Street Parking in the Dhakuakhana Town, 2041

Off Street Parking Locations	Area in Hectares	Capacity in ECS
Existing Private Bus Stand	0.2	50-60
Existing Cremation Ground	1.2	450

18.2.2 Inter-state Bus Terminal

The current ASTC and private bus stands are located adjacent to Daily Bazaar in the heart of the city. Due to this, regular congestion can be seen in various places near the market and bus stands. The infrastructure of both the bus stands is in a bad state of deterioration. Considering this, a new ISBT with a 3-hectare area has been proposed in Gohain Handique village. The proposed ISBT is located adjacent to the North Lakhimpur Road, which is the main arterial road of the Dhakuakhana planning area. The location was strategically chosen to completely remove any interstate and intercity bus congestion from the centre of the city.

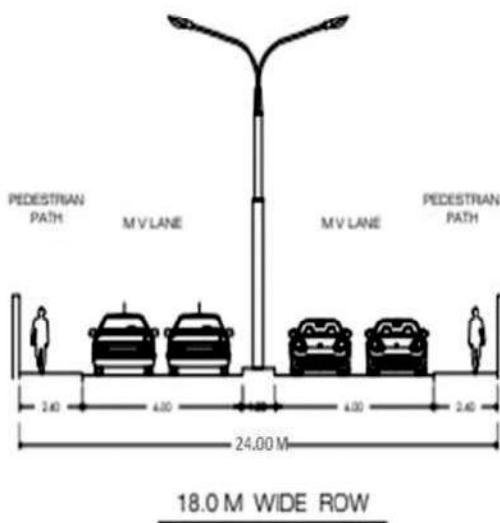
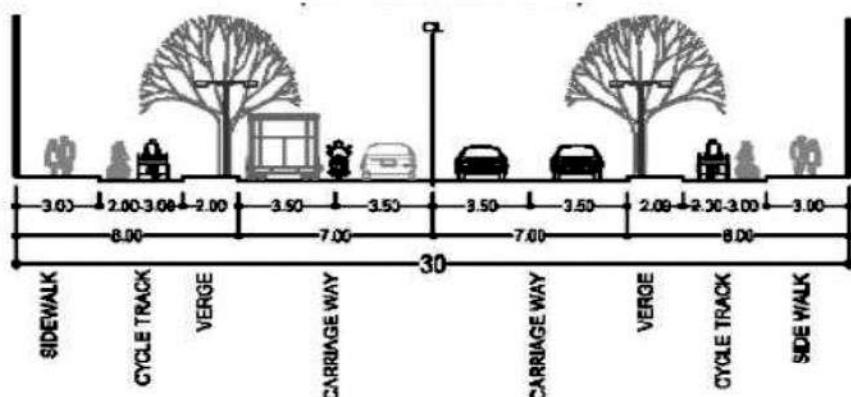
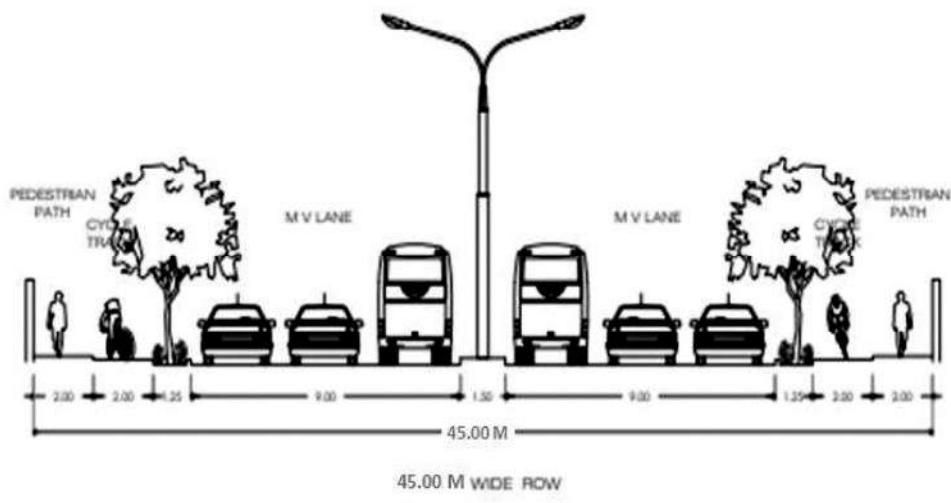
Additionally, it has been proposed in the Development Control Regulations that according to the built-up area and land uses, a property's premises should have a minimum amount of dedicated parking space.

18.3 Long-Term Proposals

18.3.1 Proposed Road Network

The analysis of road inventory in the planning area revealed that the existing road network of Dhakuakhana is highly inefficient both qualitatively and quantitatively. In light of this, strengthening of road network has been the prime focus of the proposed circulation plan. The master plan proposes to achieve this through two kinds of interventions: Widening existing roads and Construction of new roads as per the planning area's requirements. The existing North Lakhimpur-Matmora Road, College Road and Dhemaji road are proposed to be widened to a ROW of 45 meters to form the major axis of arterial roads in the town. Additionally, all major roads bifurcating from these arterial roads have been proposed to be upgraded to a sub-arterial level by widening them to a ROW of 30 meters. All major roads bifurcating from the proposed sub-arterial roads, which connect major residential settlements and public-semi-public areas, are proposed to be upgraded to a ROW of 18 meters.

New sub-arterial and collector roads have been proposed in the existing and proposed residential areas. The Master Plan for Dhakuakhana, 2041 proposes a gridiron pattern of new roads which will have grids of 1 kilometre by 1 kilometre. Existing road network and built-up areas have been taken into consideration while planning of new roads. The proposals for new roads have been drafted by keeping in mind the relocation and resettlement aspects of the existing population. Extreme care has been taken to align new roads and widen existing roads so that only a negligible amount of the population has to relocate. Arterial roads have been proposed with a 45-meter right of way, sub-arterial roads with a 30-meter right of way, and collector roads with a minimum 18-meter right of way. Proposed cross sections of these three types of roads are presented as per IRC 86 as shown in **Figure 18.1**.

Figure 18.1: Proposed Cross Sections of Roads, 2041

The levels of all major roads have also been fixed from the mean sea level for the effective and accurate execution of the proposed road network. Contour lines at a distance of 3m were generated for the entire planning area and the contour levels were obtained along major roads using the Digital Elevation Modelling (DEM) data for the planning area. The contour levels of the planning area range between 87m on the western side to 111 m on the eastern side. Contour points along the major roads have been shown in **Figure 18.3**.

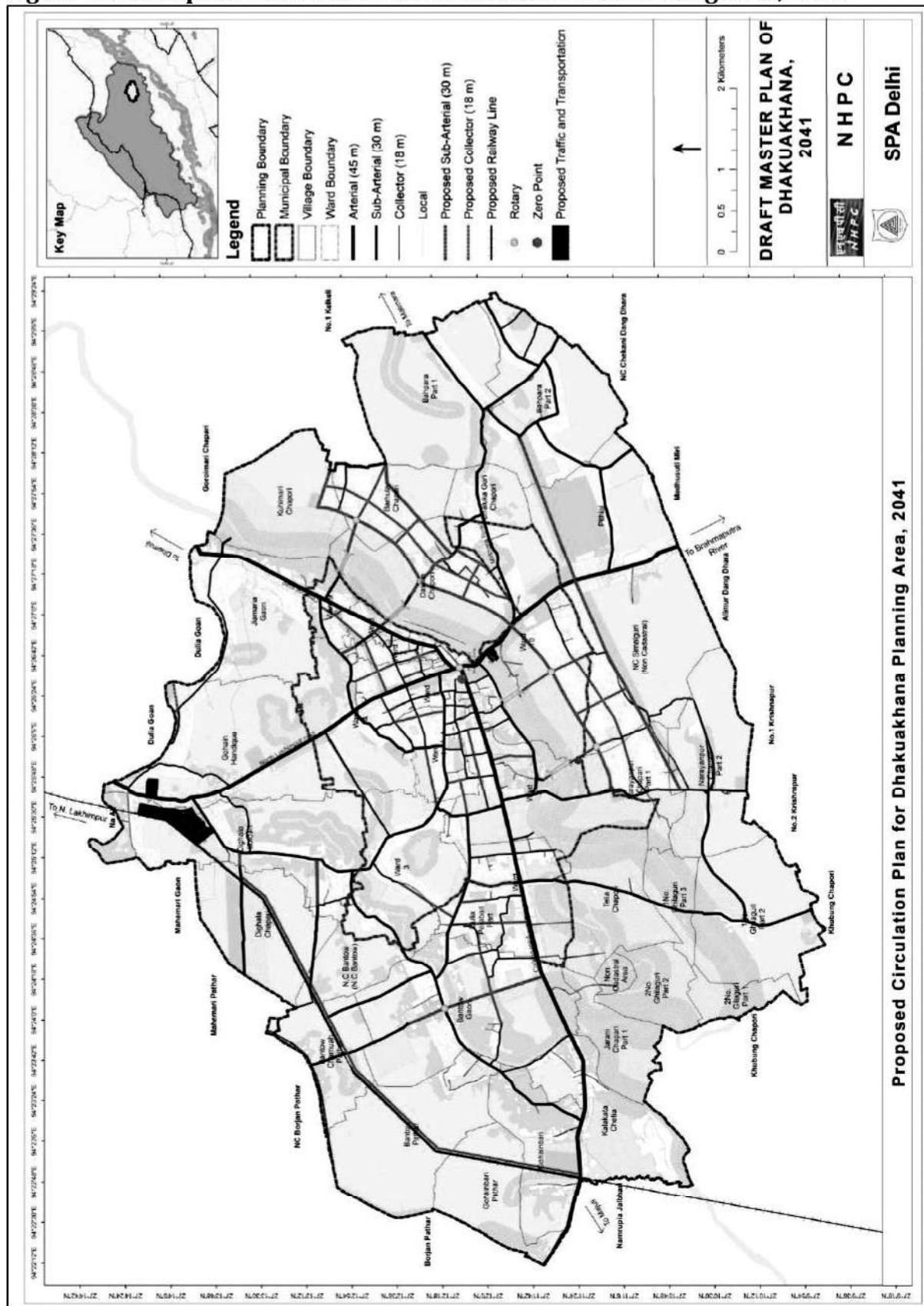
18.3.2 Railway Line and Railway Station

Dhakuakhana is the second largest town in the Lakhimpur district. Despite that, the town has no major transport nodes at present. The nearest railway station is located 30 kilometres away from the city. Since the master plan is proposing multiple commercial, economic, industrial, residential as well as public-semi-public areas in the Dhakuakhana, it becomes imperative to provide good rail connectivity to the planning area to facilitate this induced exponential growth. Considering this, a railway line connecting Dhakuakhana to Dhemaji via Gogamukh and North Lakhimpur via Majuli has been proposed in the Master Plan. This line will pass through Dighala Hiloidari, Dighala Chapari, Bantow Pathar, Bantow Chamuah Pathar, Gohainbari Pathar and Gohainbari villages. The railway line has been strategically aligned with the proposed industrial areas, proposed truck terminal and proposed ISBT. A Railway Station having an area of 10 hectares has been proposed in Dighala Hiloidari village. The station has been proposed adjacent to the truck terminal and in close proximity to the ISBT and industrial areas. A sub-arterial road has been proposed parallel to the proposed railway lines. This road will connect the proposed truck terminal & proposed industrial area in Dighala Chapari village to the proposed industrial area in Gohainbari village.

18.3.3 Truck terminal

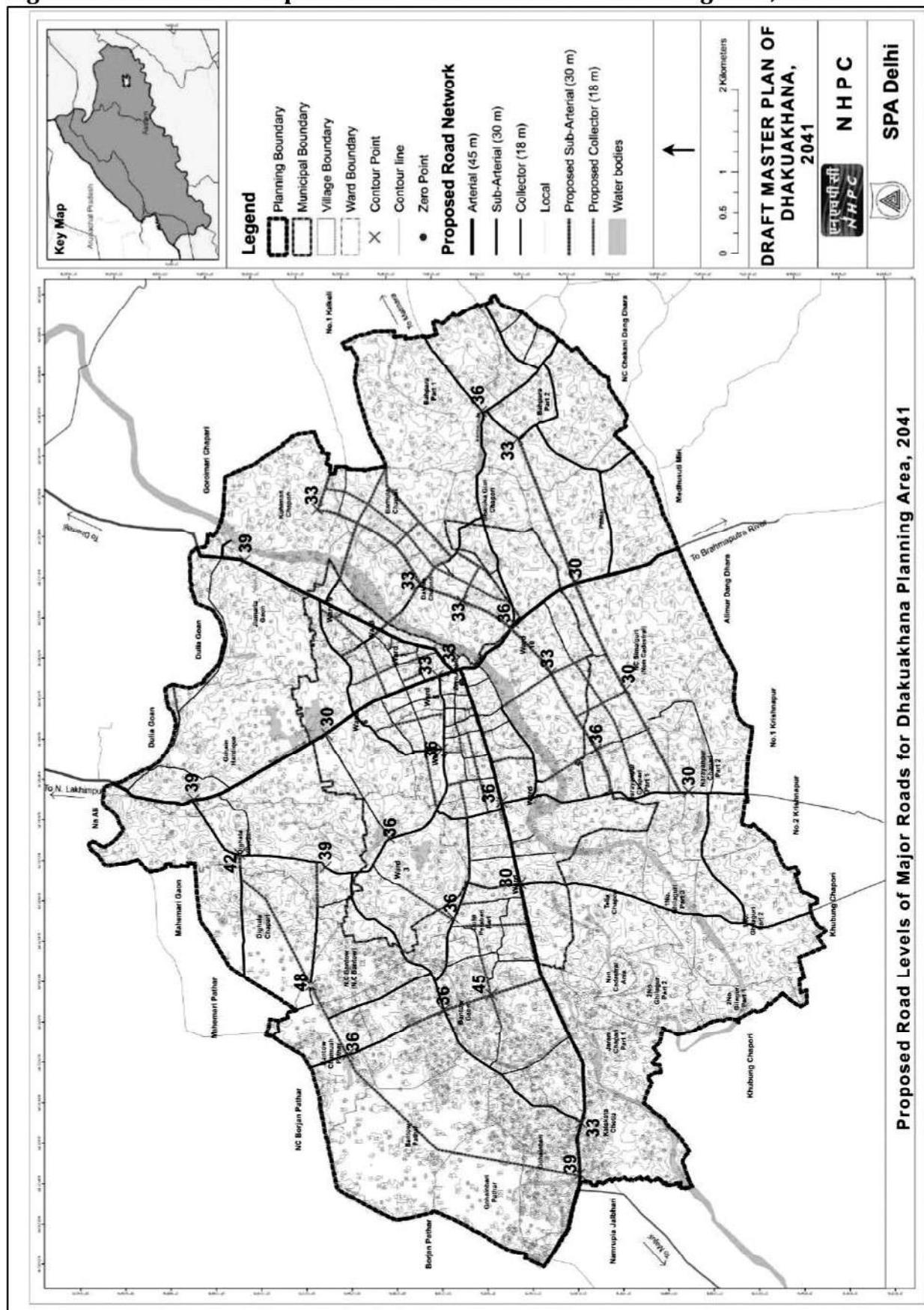
Proposed industrial development is bound to increase the logistics flow in the planning area. In light of this, one ICD- truck terminal having an area of 3 hectares has been proposed in Dighala Hiloidari village, adjacent to the proposed Railway Station and proposed industrial area. The truck terminus has been proposed to meet the logistical requirements of both the proposed industrial areas. All the proposed transport nodes have been shown in **Figure 18.2**.

Figure 18.2: Proposed Road Network in Dhakuakhana Planning Area, 2041



Source: SPA, New Delhi (2022).

Figure 18.3: Levels of Proposed Roads of Dhakuakhana Planning Area, 2041



Source: SPA, New Delhi (2022).

CHAPTER 19: PROPOSAL FOR SOCIAL INFRASTRUCTURE

19.1 Introduction

The social infrastructure facilities and amenities ensure better quality of social life in a town and proposed areas of public. It majorly involves education and health sectors, which are significant drivers of societal development. Literate population with skills in demand promotes economic and social equality and equity. Healthy citizens are an asset for economic and social development of a town. Likewise social infrastructure facilities and amenities would contribute to the vibrancy of Dhakuakhana. So, both education and health are important for a healthy and wealthy town with high quality of life. Extensive zoning for major institutional uses, healthcare facilities, recreational areas and other amenities have been proposed in different parts of Dhakuakhana.

19.2 Education

Although there is enough primary schools a few of the villages lack such facilities. Also, there is a severe lack of higher education in Dhakuakhana; hence the proposal for educational facilities is mostly related to the above mentioned facility.

The projected population for Dhakuakhana in 2041 is 55,000. As per URDPFI Guidelines 2015, 9 numbers of Senior Secondary Schools are required and at present there are 9 senior secondary schools in Dhakuakhana. But, out of 9, 7 are present within the municipal area and only 2 are present in the present village areas. Hence one senior secondary school is proposed outside the municipal area.

Also, there is absence of any school for physically challenged persons. Hence, as per URDPFI Guidelines 2015, one such school is also proposed.

The number of colleges present in Dhakuakhana is 3 which are sufficient. But, in Dhakuakhana Normal School, only diploma level education is present. Thus, bachelors and master degree courses are also proposed in this institution. Moreover, infrastructure condition is also poor which is to be improved at immediate attention.

There is lack of technical educational facilities in Dhakuakhana hence one University is proposed in Pithiyal village comprising of land area about 50 hectares. The number of educational facilities proposed for Dhakuakhana 2041 is shown in **Table 19.1**.

During the field survey by the SPA Delhi team during March 2022, it was found that the condition of most of the educational infrastructure in the town is not good. While furniture is available in most of the classrooms, the condition of the furniture and walls is poor schools are functioning without proper walls around their classrooms and temporary partitions made from tin or bamboo sheets are being used to segregate the different classes. The condition of WASH facilities is also very poor in many of the schools. Thus, it is proposed that in existing facilities these infrastructures are to be improved.

Table 19.1: Proposal for Educational Facilities in Dhakuakhana 2041

S. No.	Category	Existing Number	Population Served per Unit (URDPFI Standards)	Requirement (as per standard)	Proposed	Area (in hectare)	Remark
Pre - Primary to Secondary Education							
1	Primary School (Class I to IV)	54	2,500	26	0	-	Infrastructure to be improved in existing facilities
2	Secondary School (With Class IX and X)	15	5,000	13	0	-	Infrastructure to be improved in existing facilities
3	Senior Secondary School (with Class XI and XII)	15	7,500	9	1	1.8	Facility to be provided in village areas
4	School for Physically Challenged	0	45,000	1	1	0.7	To be provided as per requirement
Higher Education							
5	College	3	1,25,000	-	0	-	Infrastructure to be improved in existing

S. No.	Category	Existing Number	Population Served per Unit (URDPFI Standards)	Requirement (as per standard)	Proposed	Area (in hectare)	Remark
							facilities. Bachelors and master's course to start
6	University	0	As per requirement	-	1	10.0 - 60.0	Technical University to be provided as there is lack of such facility
Total						52.5	

Source: Census 2011 and URDPFI Guidelines 2015

19.3 Healthcare

Condition of healthcare facilities in Dhakuakhana is very poor in present day context. There are insufficient healthcare facilities and those are present are not in good condition.

The projected population for Dhakuakhana in 2041 is 55,000. As per RADPFI Guidelines 2015, 13 numbers of primary health sub - centres are required whereas only 1 is present within the planning boundary. Thus 12 primary health sub - centres are proposed for Dhakuakhana 2041.

The number of primary health centre or dispensary is sufficient but the infrastructure in those is to be improved. One community health centre is to be proposed to serve the entire planning area.

As per the URDPFI Guidelines 2015, one number of nursing home with child welfare and maternity centre of area 0.2 to 0.3 hectare is to be proposed to deal with maternal issues, anemia, and nutrition deficiency within the children, as at present there is no such facility present. Other than that, one family welfare centre of area around 0.08 hectare is also present as per requirement.

Dhakuakhana lacks in specialty hospital and every year major diseases like Japanese Encephalitis, Scrub Typhus, Diarrhea etc. spread within the tribal population. Thus, one

Super Speciality Hospital of area 5.0 hectare with 200 beds is proposed for the planning area in Jia Maria Gaon.

One veterinary hospital is present in Dhakuakhana, consisting of just two beds. The infrastructure is to be improved for the same. The number of healthcare facilities to be proposed for Dhakuakhana 2041 is thus shown in **Table 19.2.**

Table 19.2: Proposal for Healthcare Facilities in Dhakuakhana 2041

S. No.	Category	Existing Number	Population Served per Unit (URDPFI Standards)	Requirement (as per standard)	Proposed	Area (in hectare)	Remark
1	Primary Health Sub - Centre	1	5,000	13	12	0.08	Facility to be provided as per requirement
2	Primary Health Centre or Dispensary	4	15,000	4	0	-	Infrastructure to be improved in existing facilities
3	Community Health Centre	0	1,20,000	-	1	0.8	Facility to be provided
4	Nursing Home, Child Welfare and Maternity Centre	0	45,000	1	1	0.2 - 0.3	Facility to be provided as per requirement
5	Family Welfare Centre	0	50,000	1	1	0.08	Facility to be provided as per requirement
6	Super Speciality Hospital	0	1,00,000	-	1	5.0	Facility to be provided as there is lack of such facility
7	Veterinary Hospital	1	5,00,000	-	0	-	Infrastructure to be improved in existing facilities
Total						7.09	

Source: Census 2011, RADPFI 2016, URDPFI Guidelines 2015

19.4 Recreation

It is observed that there is severe lack of recreational facilities in overall planning area. The playgrounds and parks those which are present are only within the town area only. The recreational facilities which are proposed for Dhakuakhana 2041 are shown in **Table 19.3.**

As per URDPFI Guidelines 2015, 13 number of housing area parks are required for the projected population. Thus 12 more housing area parks of sizes 0.5 to 1.0 hectare are proposed which are to be distributed evenly within the residential sectors. Other than this, 4 neighborhood parks of size 1.5 hectare are proposed as per requirement of which 2 in Municipal Area, 1 in Narayanpur Chapor Part II village and the other in Pithiyal village as there are no such facility available. There is one existing mela ground which is sufficient for the projected population of 55,000.

In terms of sports facilities Dhakuakhana also lacks such facility. At present there are no residential unit play areas. Thus, as per requirement 13 residential unit play areas of size 0.5 hectare are proposed which are to be distributed evenly. One neighbourhood play area of size 1.5 hectare is proposed to fulfill the gap which is to be located outside the municipal area as there are already 3 within the municipal boundary.

One Outdoor Sports Centre of area 20.0 hectare is also proposed in Bantow Gaon to promote sports activities within the district.

Table 19.3: Proposal for Recreational Facilities in Dhakuakhana 2041

S. No.	Category	Existing Number	Population Served per Unit (URDPFI Standards)	Requirement (as per standard)	Proposed	Area (in hectare)	Remark
Organised Green Areas							
1	Housing Area Park	1	5,000	13	12	0.5 - 1.0	Facility to be provided as per requirement
2	Neighbourhood Park	0	15,000	4	4	1.2 - 2.0	Facility to be provided as per requirement

S. No.	Category	Existing Number	Population Served per Unit (URDPFI Standards)	Requirement (as per standard)	Proposed	Area (in hectare)	Remark
							t
Multipurpose Ground							
3	Community Level Multipurpose Ground	1	1,00,000	-	0	-	Sufficient
Sports Facility							
4	Residential Unit Play Area	0	5,000	13	13	0.5	Facility to be provided as per requirement
5	Neighbourhood Play Area	3	15,000	4	1	1.5	Facility to be provided as per requirement
6	Outdoor Sports Centre	0	10,00,000	-	1	20.0	Facility to be provided to promote sports activity
7	SIRD Integrated Sports Complex	1	-	-	0	1.0	Facility to promote Indoor sports activity
Total						43.0	

Source: URDPFI Guidelines 2015

19.4.1 Dhakuakhana Park

The park is proposed to become a centre for the town's resident's relaxation and entertainment, as well as become a centre for the town's touristic ambitions, along with being a source of alternate employment and revenue generation.

The park is to be spread over 51 bighas, approximately 7.2 hectares and the main activities are like: hawker's food court, entrance court, boating - cycling - jogging

circuit, rose and bulb garden, fruit orchard, forest trail, children's park, garden café, yoga and gym retreat, celebration ground and sculptural court.

19.5 Socio – Cultural Facilities

Dhakuakhana also lacks in socio – cultural facilities. 13 numbers of anganwadi of size 0.02 to 0.03 hectare are proposed as per requirement along with 13 numbers of community rooms of size 0.075 hectare. Other than these 4 numbers of community halls or barat ghar are proposed as per URDPFI Guidelines 2015. These facilities are to be distributed evenly within the planning area. One existing cremation ground is present in Ward 10 which is to be converted to off-street parking of 450 ECS. Other than this, 2 cremation grounds each of area 2 hectares are proposed within the municipal area, ward number 2 and 6 and one proposed in Kuhimari Chapor village of the same area. The proposed socio – cultural facilities are provided in **Table 19.4**.

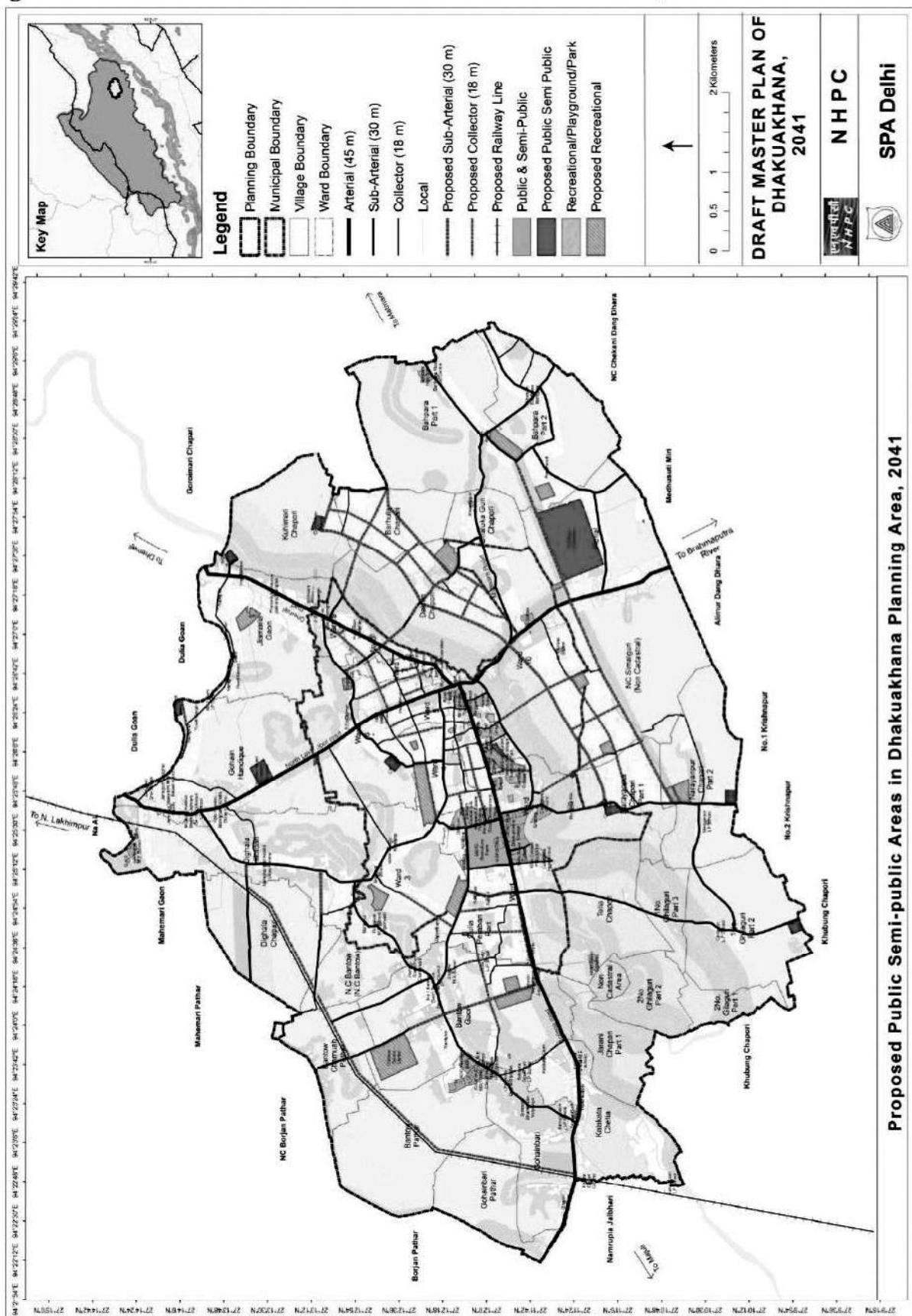
Table 19.4: Proposal for Socio Cultural Facilities in Dhakuakhana 2041

S. No.	Category	Existing Number	Population Served per Unit (URDPFI Standards)	Requirement (as per standard)	Proposed	Area (in hectare)	Remark
1	Anganwadi	0	5,000	13	13	0.02 - 0.03	Facility to be provided as per requirement
2	Community Room	0	5,000	13	13	0.075	Facility to be provided as per requirement
3	Community Hall, Barat Ghar	0	15,000	4	4	0.2	Facility to be provided as per requirement
4	Cremation Ground	1	5,00,000	-	3	2.0	Facility to be provided due to lack of facility
Total						8.1	

Source: URDPFI Guidelines 2015

The proposed social infrastructure facilities and amenities for Dhakuakhana Planning Area, 2041 has been shown below in **Figure 19.1**.

Figure 19.1: Social infrastructure Facilities in Dhakuakhana, 2041



Source: SPA New Delhi (2022)

CHAPTER 20: PROPOSAL FOR PHYSICAL INFRASTRUCTURE

20.1 Introduction

Physical infrastructure, involving water supply system, storm water drainage, sewerage system, and solid waste management system, provides the lifeline to resident population of an urban settlement as well as an input and outcome for and from industry, trade, and commerce. In this chapter, the Master Plan for Dhakuakhana 2041 begins by making spatial planning proposals for water and drainage systems.

20.2 Water Supply and Storm Water Drainage

Water supply in Dhakuakhana planning area needs extensive development as currently there is no provision of providing piped water supply to the households. As per Central Public Health Environmental Engineering Organization (CPHEEO) manual on Water Supply and Treatment 1999, 135 LPCD of water should be supplied in urban areas with piped sewerage network. As the projected population of Dhakuakhana is 65,000, the total water demand is calculated to be 8.78 MLD for year 2041. As there is no provision of water supply, the total gap is calculated as 8.78 MLD. Considering 20 percent losses which include transmission loss, theft and leakages, losses will amount to 1.75 MLD hence the actual water demand is calculated to be 10.55 MLD which includes fire demand of 0.02 MLD and the actual gap will be 10.55 MLD for the year 2041. To mitigate this water demand two water treatment plants has been proposed in Dhakuakhana planning area. One WTP will have capacity of 10 MLD which will receive the raw water supply from surface water source of Charikariya River, another treatment plant will have capacity of 2 MLD and the raw water supply will be sourced from ground water as ground water table in Dhakuakhana planning area is sufficiently high. The future scope of expansion for WTP will be 30 MLD which is 2.5 times higher than current demand. The design period for both WTPs will be 15 years as recommended by CPHEEO 1999 guidelines. Distribution network will be designed for 30 years.

Table 20.1: Proposal for Water Supply in Dhakuakhana Planning Area, 2041

Projected Population for 2041	65,000
Per Capita Water Demand (in LPCD)	135
Total Water Demand (in MLD)	8.78
Transmission and other losses in Percent	20
Total Losses (in MLD)	1.75
Fire Demand (in MLD)	0.02
Actual Water Demand (in MLD)	10.55
Existing Supply (in MLD)	0
Demand Gap (in MLD)	10.55
Proposed Water Supply (in MLD)	12
Scope of future expansion (in MLD)	30
Area required for Water Supply System as per URDPFI (in Ha)	2
Proposed Area provided (in Ha)	4

Source: SPA New Delhi (2022).

According to the CPHEEO 1999 guidelines, the fire demand for a town with population more than 50,000 can be calculated with the formulae $100\sqrt{P}$ where P is population. Hence, the fire demand for 2041 is calculated as 0.02 MLD and water will be supplied from WTP (**see Table 20.3**). WTP near Charikariya River will draw raw water from surface source while the WTP situated near proposed ISBT will have ground water as its source. Filtration methods for each WTP would be used and are explained below.

WTP will have four stage water cleansing procedure as suggested by the CPHEEO 1999 guidelines. The preliminary stage involves passing of raw water from protective bar and screening bar to eradicate heavier particulates. In primary stage raw water after preliminary stage is then passed through aerators to increase dissolved oxygen. This process reduces odor and color present in raw water. In secondary process, raw water is mixed with chemicals for the process of sedimentation and flocculation to eradicate suspended particulates from raw water. The treated water is then disinfected by using chemicals such as chlorine and additional chlorine is added to treated water to keep water disinfected during supply process. Treated water is then pumped to storage reservoirs.

20.2.1 Over Head Tank (OHT)

The area required for every OHT will be 0.5 Ha which consists of guard room, pump room and inspection room. The base of the tank will be 15 to 20 meters high from ground level depending on engineering requirements. The volume of the tank is calculated as 40 lakh liters each to suffice distribution of 12 MLD water for Dhakuakhana planning area. As per suitable design, if the shape of tank is rectangular, the dimensions will be 10 meters height, 20 meters length and width. If the shape is cylindrical, the dimensions will be 10 meters height and 22.6 meters in diameter. The placement of OHT is done as per population distribution to cater to every household in the town.

20.2.2 Water Distribution Network

Water pipeline network is placed within proposed planning area in the entire town. The network will be equipped with pressure valves and check valves as required by engineering standards. High emphasis will be placed to reduce transmission losses, leakages, and chances of theft. Every household in the planning area will relate to proper metering setup (**see Figure 20.3**). The network will be developed under Municipal Board of Dhakuakhana.

20.2.3 Drainage Network

Rainfall in Dhakuakhana planning area is high and water logging issues have been prominent in Dhakuakhana as discussed in Chapter 6. To mitigate this issue, a comprehensive drainage network is proposed for the entire town. According to India Meteorological Department 2019, average annual rainfall in Lakhimpur district is 2,810 mm with rain-day of 217.2 days. As per proposed land use of Dhakuakhana planning area, the total built-up in Dhakuakhana planning area is 16.17 sq km and the total area within Planning Boundary is 60.97 sq km. The maximum rainfall recorded at Dhakuakhana is 1,445.21 mm for 29 days in the year of 2015, which is 49.83 mm or 1.96 inches per day. To calculate peak storm water discharge, formulae of discharge is used which is a product of coefficient of runoff (C), catchment area and rainfall intensity. C is taken as 0.45 for open fields and 0.75 for built-up or constructed area. Hence peak storm water discharge is calculated as 1,64,364.1 cubic meters per hour for Dhakuakhana Planning area. Considering storage capacity of the drainage network to be

15 minutes, the drainage system should be designed to store a volume of 41,091.02 cubic metres.

Considering storage capacity of the drainage network to be 15 minutes, the drainage system should be designed to store a volume of 41,100 cubic meters. The length of main drainage line is 58.45 km along the proposed arterial roads; 75.72 km for sub-main drains along subarterial roads; sub-sub drains of length 127.85 km along collector roads and local drains of length 78.92 km along local roads (**see Sanitation system proposal**)

As per the analysis research on the sanitation system in Dhakuakhana town, it was observed that majority of the houses does not have latrine facilities within their premises and alternative source of defecation were either public latrines or open defecation which causes pollution to the environment and health issues to the people residing in and around the area. Majority of the households connected to the latrines had septic tanks for the disposal of the faecal residue and only 1.1 percent of the household were connected to piped sewer.

Figure 20.1).

Arterial roads and sub arterial roads will have both side drainage channels with average cross-sectional area of 1 sq meter and 0.5 sq meter respectively. Collector roads and local roads will have one side drainage channels with average cross section area of 0.139 sq meter and 0.046 sq meter respectively (**see Sanitation system proposal**)

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Figure 20.1). The construction of drainage network shall be as per Manual on Storm Water Drainage Systems - 2019 provided by Central Public Health & Environmental Engineering Organisation (CPHEEO).

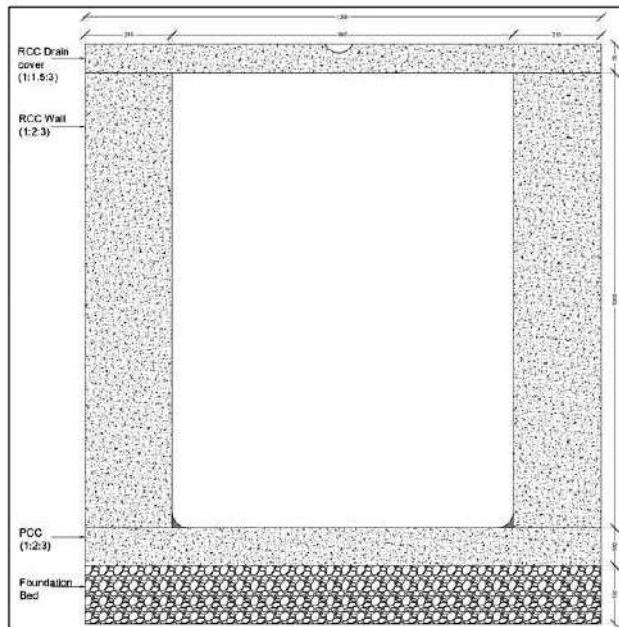
The Drainage Network will be developed by Municipal Board of Dhakuakhana. Drainage lines shall be fully covered to avoid pollutants and solid wastes entering drainage channels which may lead to blockages. Excessive runoff will be discharged into the Charikariya River and water bodies available in planning area. Monthly inspection of drainage lines is recommended to check proper functioning of drains. The final design of Drainage section may change based on the detailed analysis and requirements of the future drainage plan (**see Figure 20.2**).

20.2.4 Provision of Fire Hydrants

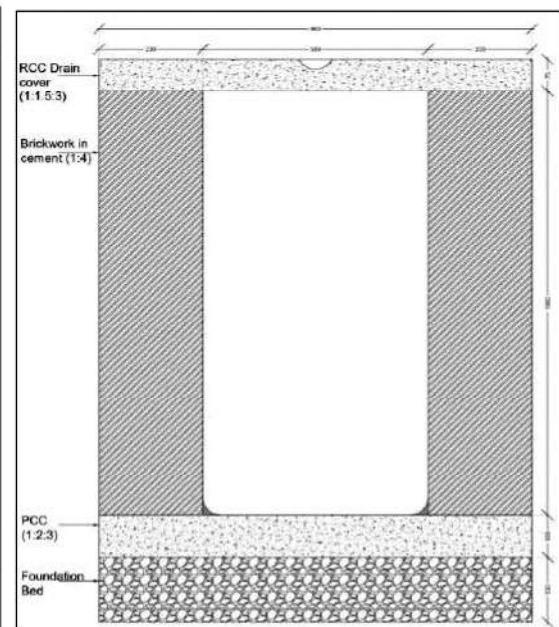
Within the market areas, concept of underground pipelines for fire-hydrants on the periphery exclusively for firefighting services should be considered. As per IS 13039:1991, the fire hydrants should be provided at intervals of 100m, but this distance may be suitably increased or decreased depending on the risk in the area desired to be protected.

20.3 Sanitation system proposal

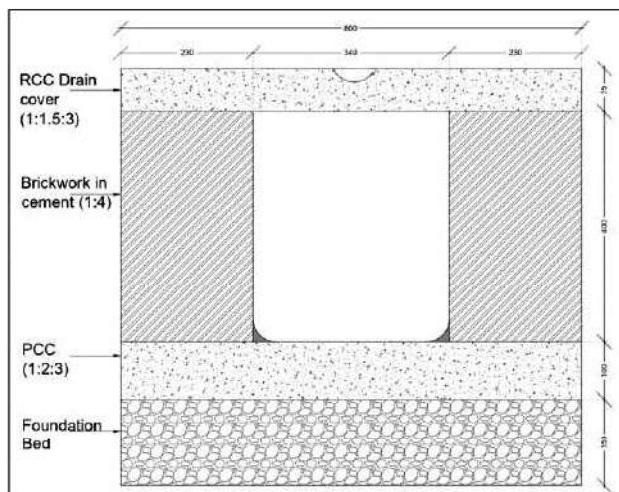
As per the analysis research on the sanitation system in Dhakuakhana town, it was observed that majority of the houses does not have latrine facilities within their premises and alternative source of defecation were either public latrines or open defecation which causes pollution to the environment and health issues to the people residing in and around the area. Majority of the households connected to the latrines had septic tanks for the disposal of the faecal residue and only 1.1 percent of the household were connected to piped sewer.

Figure 20.1: Typical Cross-section of Drainage Network

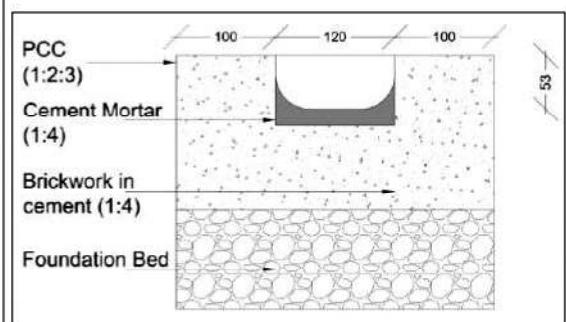
Cross section of 1.0 sq m drain



Cross section of 0.5 sq m drain

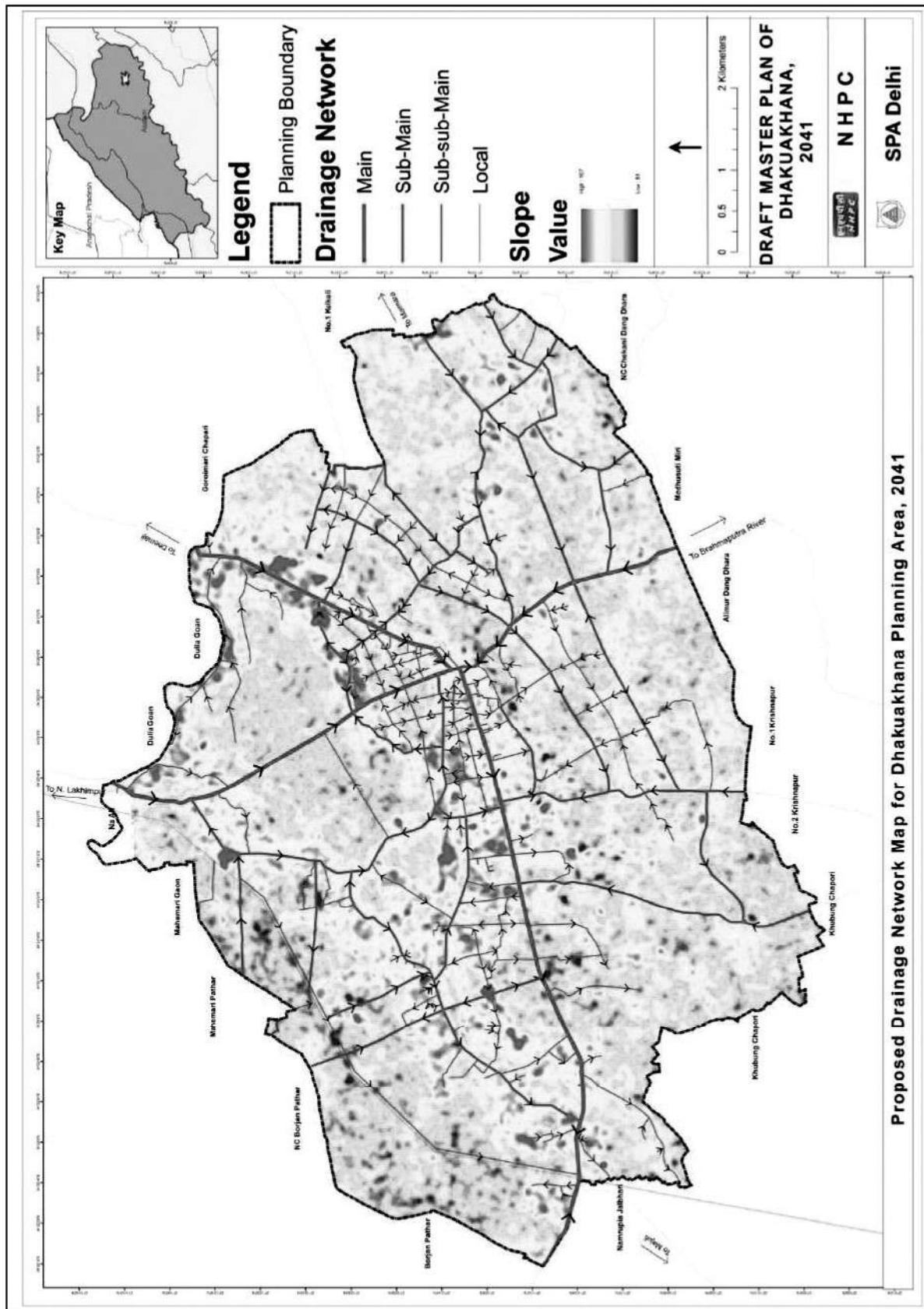


Cross section of 0.139 sq m drain



Cross section of 0.064 sq m drain

Figure 20.2: Proposed Drainage Network of Dhakuakhana, 2041



Source: SPA New Delhi (2022)

To achieve a proper sewerage system, an adequate amount of water supply is required to be connected to each household which is necessary to channelize the grey and black water to the treatment plant, for which as per the water supply demand of 12 MLD projected for the year 2041, an FSTP (Faecal Sludge Treatment Plant) of 10 MLD covering an area of 2 Ha has been proposed in 1 No Gilaguri Part 2 village to treat the waste discharge considering conversion factor of 80% between supplied water to sewer as suggested by CPHEEO manual on sewerage and sewerage treatment system 2013. The treatment plant is designed for 15 years, and conventional sewer are designed for 30 years. The FSTP will treat effluent by Active Sludge Digestion process which is most used in STP's across India. The treated wastewater will then be discharged in the Charikariya river which is approx. 1 km away from the site.

20.4 Solid Waste Management Proposal

Management of solid waste is one of the major challenges that Dhakuakhana faces. The consequences of openly dumping solid wastes in open fields can prove to be detrimental for the people residing in the planning area as it can cause various health and environmental hazards. The existing dump site in Ward 2 having an area of 0.3 Ha is located only 85 metres away from the Charikariya River. This is a matter of concern as the pollutants from the dumpsite can contaminate the nearby water body as well as ground water. To mitigate the issue of solid waste, the exiting waste management site has been shifted from Ward 2 to the planning area. The new Waste Management Site (WMS) of 2.25 hectares has been proposed in the village Narayanpur Chapor Part 2.

Per capita waste generation for the town, as per Proposal for Rehabilitation of Legacy Municipal Solid Waste at Dumpsite and Fresh Municipal Solid Waste 2021, is 0.3 kg waste per day. So, the total waste generation in the planning area for the projected population size of 65000 would be 19.5 metric tons per day. To manage the wastes, the sites will be equipped with plastic reuse mechanism, wastepaper recycling unit and decomposition of organic waste for organic compost manufacturing which could be used by nearby cultivators for crop production. The existing waste dump is proposed to be redeveloped as social forestry preferably with plantations that can help rejuvenate the degraded land.

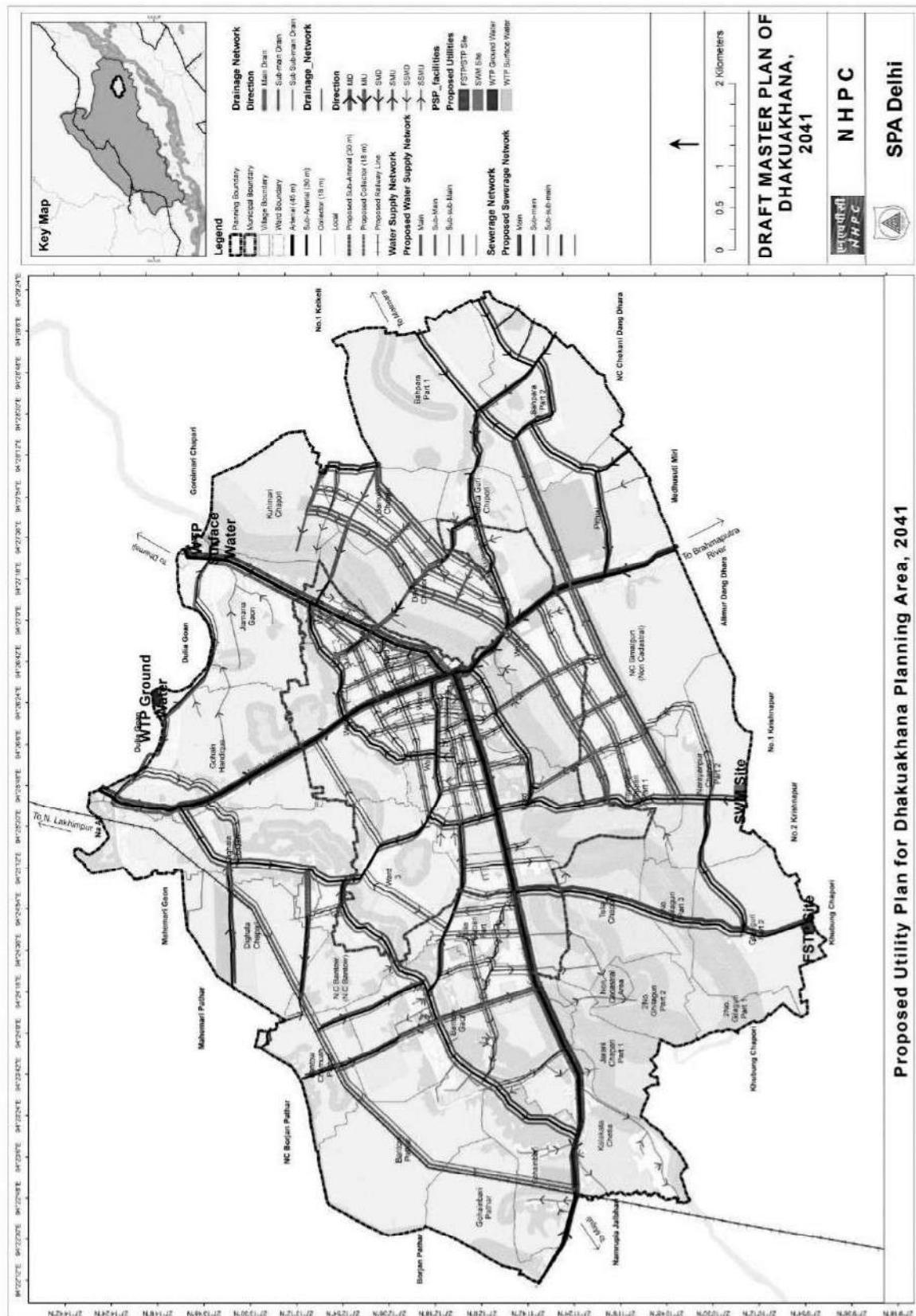
According to Municipal Board of Dhakuakhana, under *Swacch Bharat Mission (Urban)*, one Cesspool Cleaner is functional in Dhakuakhana town. One 'Composting Machine' and one 'Plastic Shredding Machine' is also available with the Municipal Board; however, their installation is still pending. Four new Machineries have also been ordered which includes two Hydraulic trolley tractors mounted, one open drain cleaning machine and one stainless steel hydraulic dustbin; however, these machines are yet to be delivered and their operations will take time. These machines will reduce the burden of Solid Waste from Dhakuakhana town. It is proposed to expedite the procurement and functioning of these machines at the earliest to aid the solid waste management of the planning area.

It is also proposed that all waste collection vehicles should be completely covered and need to have separate chambers for dry and wet waste. Waste should be collected every day and delivered to the Waste Management Site. For optimizing the process of waste management, it is proposed to encourage household dwellers to practice on-site segregation of waste, i.e., making use two separate bins for dry and wet waste. Public dustbins also need to be placed with two separate chambers in all commercial and public-semi-public areas. For the safety of waste collectors, it is advised that they wear protective gloves, masks, glasses, and helmet, for the entirety of their work period. Provision for regular health checkups of waste collectors should be made free of cost to ensure their optimal health.

Having discussed all the important elements of physical infrastructure including water supply network, sewerage network, drainage system, and solid waste management, **Figure 20.3** shows all the utilities on a single map.

Solid waste transfer stations are to be evenly distributed within the planning area to effectively segregate and store waste before disposal.

Figure 20.3: Proposed Utility Network of Dhakuakhana, 2041



Source: SPA New Delhi (2022).

CHAPTER 21: PROPOSAL FOR TOURISM

21.1 Introduction

Travel and tourism have become one of the largest industries in the world. Tourism helps to improve regional as well as local economic development. It could transform nature and cultures into resources that can be experienced and used by tourist and tourist industry. This chapter discusses planning strategies and policy proposals which will help to promote the tourism industry in the city in a sustainable manner such that natural resources aren't disturbed.

Dhakuakhana has a great potential to promote its tourism industry through beautiful sericulture farms and its cultural textile art that represents an amalgamation of generations of experimentation with fabrics and handloom skills. Second, expansion of cultural tourism in form of proposed cultural tourism hub with a tourism information center which will display the vibrant culture, art, folklore, and tradition of the locals, where visitors can experience the life and learn about the history of the people there. Lastly, the natural beauty of the town has a lot to offer in terms of lush green landscapes and the breathtaking scenery which is like no other.

21.2 Tourist Circuit

The tourist circuit is designed in such a way to motivate people to visit most of the places identified in the circuit such that this sector can significantly contribute to the economy of the town. It is developed based on accessibility and connectivity connecting all potentially tourist places to one another and provides better accommodation and infrastructure to attract tourists.

The proposed tourist circuit around Dakhukhana planning area includes seven tourist areas. Total length of the tourist circuit is 13.5 – 14 km. A traveller can witness the richness of the place and culture through the proposed village themed resort, silk farm tour within the planning area and get hands-on experience of techniques used by artisans to produce handloom products through joining workshop. This circuit is also connected to its nearby famous tourist spots such as Basudev Than, which is a representation of the unique Ahom culture and traditional Assamese architecture and